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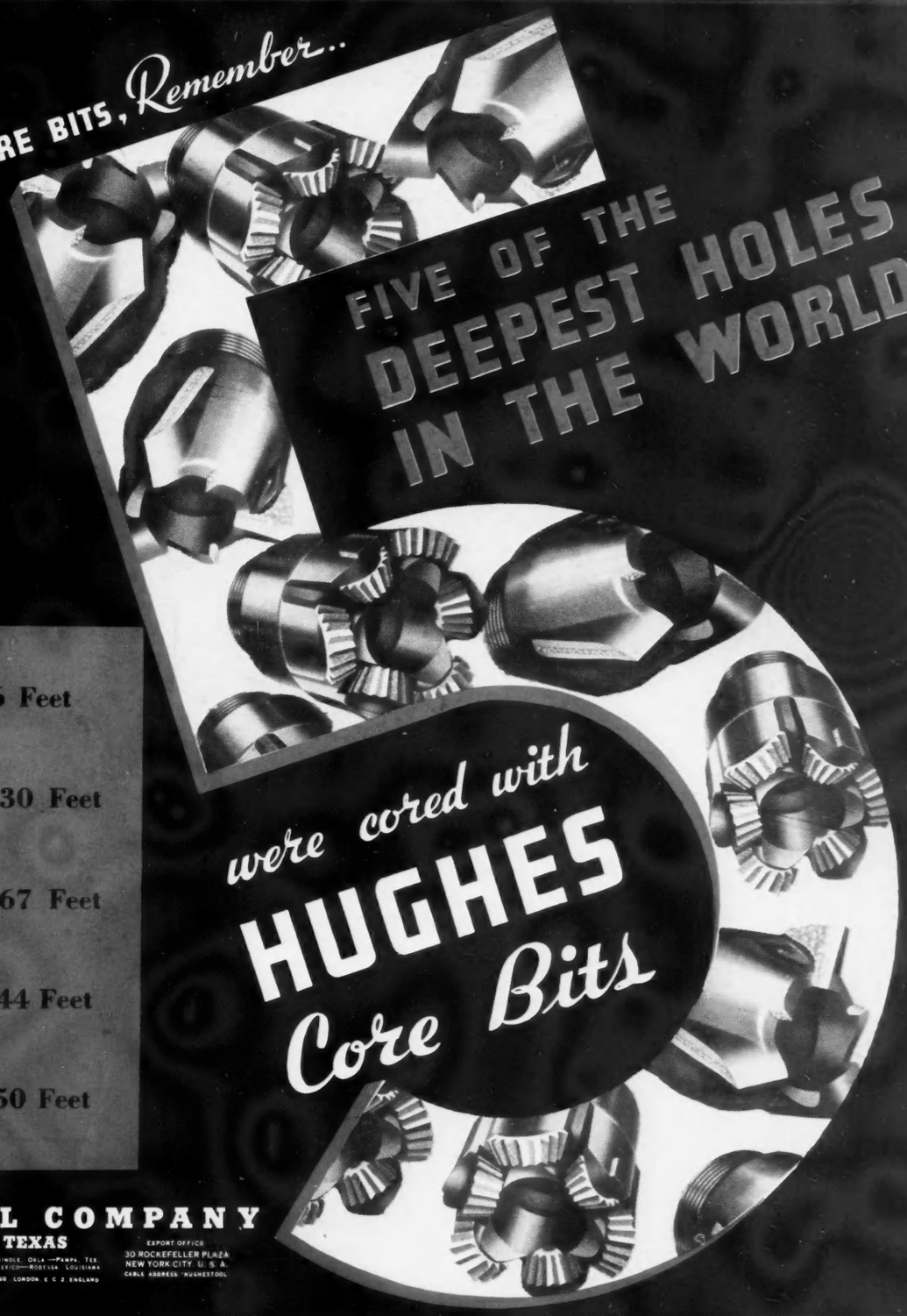
OIL WEEKLY

FOR OIL AND GAS PRODUCERS AND PIPE LINE MEN

THE WEEK'S NEWS INTERPRETED

WHEN BUYING CORE BITS, *Remember...*



Texas 12,786 Feet

Oklahoma 11,230 Feet

Roumania 11,167 Feet

California 10,944 Feet

Louisiana 10,750 Feet

HUGHES TOOL COMPANY

HOUSTON, TEXAS

BRANCH SERVICE PLANTS
LOS ANGELES, CALIF.
OKLAHOMA CITY, OKLA.
MIDLAND, TEXAS

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HUTCHINSON, KANSAS — EUNICE, NEW MEXICO — ROBESSA, LOUISIANA

EUROPEAN REPRESENTATIVE: 6 FINSBURY SQ., LONDON, E. C. 2, ENGLAND

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VOLUME 80 FEBRUARY 24, 1936 NUMBER 11

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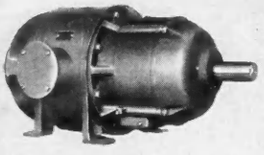
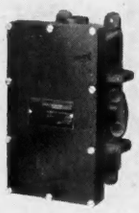
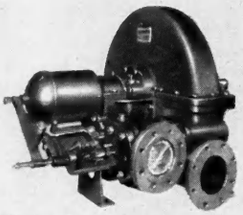


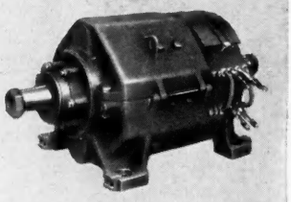
Explosion-proof gear-motor. Class I, Group D, polyphase and single-phase types



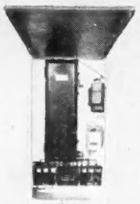
Explosion-proof manual motor-starting switch



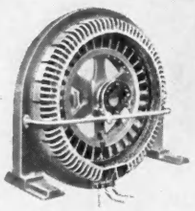
Mechanical-drive steam turbine, for driving mud screens, centrifugal pumps, and blowers



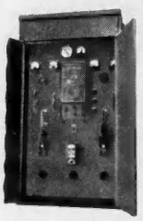
MD-400 direct-current motor, for rotary-rig drives



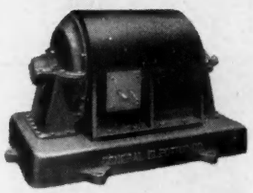
Control equipment in weatherproof cabinet, for outdoor use



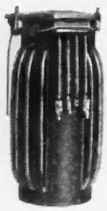
Low-speed synchronous motors, for direct drive of reciprocating compressor



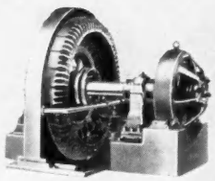
Outdoor switchgear unit, for controlling rotary-rig, engine-driven generators



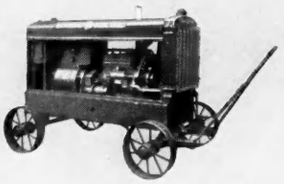
Squirrel-cage induction motor with air intake and discharge through the base, for pipe-line pump drive



Distribution transformers available in ratings up to 500 kv-a. for commercial voltages up to 73,000



Diesel-engine-driven a-c. generators, for pipe-line pumping stations



Type WD gasoline-engine-driven arc welder

Open-type floodlight, for night work

011-59

GENERAL ELECTRIC

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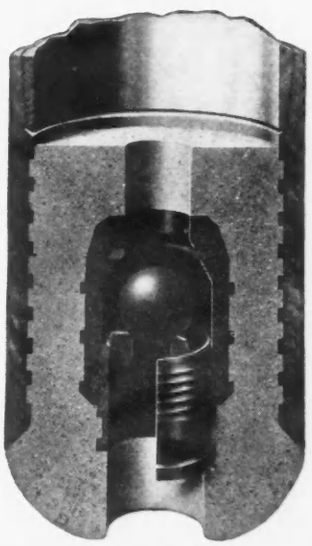

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Contents « February 24, 1936

Volume 80, Number 11

THIS WEEK 7

GENERAL NEWS:

Eye Import Revenue 8

Second Recovery—Economy of Production Is Theme of Wichita Meeting 9
By Warren L. Baker

Show Need of Reserves—Engineers Reiterate Need for Finding More Sources 10
By Wm. V. Gross

Geologists Program—Associated Bodies Meet at Tulsa March 19-21 18

Bureau Estimate of Demand for March 71

Men in the Industry's News 16

Squeaks From the Bull Wheel 104

ENGINEERING AND TECHNICAL:

Flow of Oil-Gas Mixtures in the Tubing of a Well 31
By B. H. Sage and W. N. Lacey

Present Production Methods—Oklahoma City Field 42
By Fred A. Lichtenheld

Gas Repressuring in Eastern Kansas 46
By N. M. Hutchinson

The Individual Pumping Unit and Its Engine Power 54
By J. S. Montgomery

MARKETS AND STATISTICS:

Motor Fuel Demand Up 6.5 Percent in 1936 20
By Fred Van Covern

Weekly Market Review 61

FIELD REPORTS 71

NEW PRODUCTS AND EQUIPMENT NEWS 101

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NEW YORK

THE OIL WEEKLY

FOR OIL AND GAS PRODUCERS
AND PIPE LINE MEN

ENGINEERING NEWS STATISTICS

WARREN L. BAKER, Editor.

. . . this Week

SUCH weather as has continued over the greater portion of the country during the last several weeks is well calculated to upset the forecasts on gasoline consumption, especially after winters such as have been for the last few years when automobile traffic hardly was affected by the cold. Consequence is that there is a piling up of gasoline inventories that is causing concern in some quarters over the probabilities that the price will not hold. There are those who are saying that the recent price adjustment upward was premature. On the other hand, with the weather continuing so cold, oil furnaces are working over time and the old kerosene stove is busy, not to mention what is happening to gas bills. Fuel and gas oil stocks are going down as gasoline stocks go up at refineries—and oil is oil so far as the producer is concerned.

ESTIMATES of demand for petroleum in the United States are that a peak of 3,000,000 barrels per day will be required during the third quarter of this year. And during that period 2,900,000 barrels will be required to be produced from domestic wells. Daily average for the year is set at 2,830,000 barrels, as against 2,722,000 barrels daily last year. These figures are predicated upon an increase of 6.5 percent in motor fuel demand in this country and normal consumption in other parts.

Page 20.

BUT however good business may get, it appears that the situation in California will not clear up so that producers there may have the price increase that has been promised them.

CARRYING coals to Newcastle becomes indeed an *old* saw now that crude oil is being shipped in tank cars from Rodessa to refining plants in East Texas, pending completion of a pipe line. The Connally law has been spoken of as protecting the rest of the world from Texas, and now it seems Texas may need some help.

IN journeying to Kansas for its Spring Meeting, the Mid-Continent Section of the American Petroleum Institute Division of Production had an interesting program that dealt largely with Kansas and the problems of economically producing oil under conditions which obtain in that state.

Page 9.

The Oil Man's Calendar

MAR. 19–21	American Association of Petroleum Geologists, Tulsa, Oklahoma.
19–21	Society of Petroleum Geophysicists, Tulsa Hotel, Tulsa, Oklahoma.
APR. 9–10	American Petroleum Institute, Division of Production, Southwestern District, Shreveport, Louisiana.
11–13	Petroleum Industry Electrical Association, Tulsa, Oklahoma.
13–17	American Chemical Society, Petroleum Division, Kansas City, Missouri
14	American Petroleum Institute, Division of Production, Pacific Coast District, Los Angeles, California.
16–18	National Petroleum Association, Cleveland, Ohio.
20–25	Oil Equipment & Engineering Exposition, Houston, Texas.
MAY 5– 8	American Gas Association, Natural Gas Department, Dallas, Texas.
13–15	American Petroleum Institute, Mid-Year Meeting, Tulsa, Oklahoma.
13–15	Natural Gasoline Association of America, Tulsa, Oklahoma.
16–23	International Petroleum Exposition and Congress, Tulsa, Oklahoma.
21	Independent Petroleum Association, Tulsa, Oklahoma.
22	National Stripper Well Association, Tulsa, Oklahoma.
JUNE 18–19	Pennsylvania Grade Crude Oil Association, State College, Pennsylvania.
NOV. 9–12	American Petroleum Institute, 17th Annual Meeting, Chicago, Illinois.

AMERICAN Petroleum Institute's Division of Production has just released a group of three papers, a part of the report of the Advisory Committee on Fundamental Research on Occurrence and Recovery of Petroleum, of which Dr. W. N. Lacey of the California Institute of Technology is director. Methods used in evaluating energy quantities involved in the flowing process are discussed in some detail in the first of this group which appears in this issue, to be followed by the other two in subsequent issues.

Page 31.

NO gathering of the learned in the oil industry would be orthodox without "viewing with alarm" (especially in election year) the dwindling visible supply of crude petroleum. The annual session of the Petroleum Section, American Institute of Mining and Metallurgical Engineers was no exception. And, too, the gathered engineers concerned themselves interestingly over some subjects of the present. And the whole body of engineers elected an oil man as their president for the ensuing term.

Page 10.

ARGUMENT in favor of limiting imports of oil bring forth a new note on the economic status of the farmer in Oklahoma, and we must guess in other oil-producing states. Representative Ferguson of Oklahoma tells a committee that farmers in his state received in oil royalties and rentals more than ten million dollars above the total of the farmers' land taxes and mortgage interest, and that the oil income was eleven million dollars more than AAA payments in that state. Farmers with an income of some thirty million dollars net before their plowing starts picture why the Cookson Hills continue so convenient for bank robbers, whether or not it is a good argument for legislators from non-oil-producing states to insure high costs of gasoline. No wonder that the aesthete of Oklahoma demand landscaping of the oil wells around the capitol grounds.

Eye Import Revenue

ONLY APPEAL OF DISNEY BILL IS EASY TAXING

WASHINGTON, D. C.

PROPONENTS of the Disney bill to limit imports of foreign oil and to double the present import excise taxes may secure enactment of the tax portion of the measure in connection with revenue legislation which is shortly to come before Congress.

Faced with the task of raising four hundred to five hundred million dollars to finance the new farm program and desirous also of securing additional revenues to cover other activities if it can be done without too great disturbance to business, members of Congress are seeking new sources of revenue and are understood to be studying the Disney bill tax provisions.

The bill provides for an increase in the excise tax on imported oil from 21 to 42 cents per barrel, which it is estimated would bring in an additional revenue of approximately $10,000,000 a year.

Imports last year were in the neighborhood of 54,000,000 barrels, the tax revenue from which was approximately $11,340,000, but it is held by oil experts that the 1935 importations were entirely too great and that the normal level should be about 45,000,000 barrels, which would meet Disney bill requirement that imports be limited to 4.5 percent of domestic demand.

On the basis of a 45,000,000-barrel importation, the excise tax collections at the proposed rate of 42 cents per barrel would run about $19,000,000 a year.

Another $5,000,000 a year, however, could be secured by adoption of another provision of the bill, which would extend the tax to fuel oil, now entering free at the rate of 36,000 barrels a day.

In view of the determination of congressional leaders to end the present session as close to April 15 as possible and their decision, in line with that policy, not to permit consideration of controversial measures unless part of the President's relief and recovery program, except where they can be considered by the Senate and House of Representatives in between "must" bills, there is no great chance of enactment of the Disney bill this year.

Realizing this situation, supporters of the measure are understood to be hopeful that the House ways and means committee, in considering revenue legislation, will see fit to include the excise tax increases proposed by Representative Disney, believing that the doubling of the present tax and the inclusion of fuel oil would go far toward limiting imports to a figure nearer the 4.5 percent of domestic demand which is proposed.

Pleads Import Ban

Enactment of the Disney import-oil bill is more important to the farmers of Oklahoma than any farm-relief legislation which Congress can enact, members of the House ways and means committee were told last week by Representative Phil Ferguson.

Urging the committee to take prompt favorable action on the measure, which would limit oil imports and double the exise taxes now imposed on foreign oil and its products, the Oklahoma Congressman asserted that "the stability of the domestic petroleum industry which is involved in the Disney bill should mean more to the state of Oklahoma than all the relief and emergency measures which have been proposed."

Taxes on all the farms of the state in 1934 amounted to $9,360,000, while interest charges on farm mortgages amounted to $12,130,000, a total of $21,490,000, he declared. Against this, farmers and landowners received in oil rentals and royalties $31,890,000. This sum was more than $11,000,000 in excess of the total paid to Oklahoma farmers under the Agricultural Adjustment Act.

"These payments," he explained, "were made possible by the fact that for the past few years under the code of fair competition for the petroleum industry there was some definite limitation of imports, resulting in a new security and confidence which the oil industry had not previously felt for many years.

"This tremendous investment and the benefits to the farmers of Oklahoma, as well as to employes of the petroleum industry and to the general public in that state, are all continuously jeopardized by the constant threat of an increasing invasion of the domestic market by cheap foreign oil," Representative Ferguson continued. "Carrying a tremendous burden of taxation, such as is not levied upon any other product in this country, I feel that it is impossible for domestic petroleum, whether produced in Oklahoma or in any other oil state, to successfully compete with the cheap foreign petroleum which is exempt from this taxation burden and pays only a small oil excise tax in addition to such sales tax as might be payable at the filling station.

"I find that there is at present no limitation upon the amount of this foreign oil which might be imported. The stability of this industry, so important to Oklahoma and to nearly half the other states of the Union, may be destroyed in any month if there is not some federal legislation imposing a fixed ratio for such imports.

"The petroleum industry has been more of an agency to distribute money rather than to make profits for a long period back," he said. "It has been a free collecting agency for the tax bureaus of cities, states and the nation. It is also active as a collection agency to receive money for payment in wages and to supply the necessary materials as well as to distribute among farmers, landowners and others almost incredible sums of money.

"The situation which has prevailed during the past decade cannot be continued indefinitely. The brief period of semi-prosperity enjoyed by the industry in the last year or two was due, in larger part than many realized, to that balance of supply with demand which could have not been attained if there had not been this import limitation made possible by the aid of the federal government. With the end of NRA, the federal government's assistance in the limitation of foreign oil was ended. The whole industry is now dependent upon the pleasure and self-restraint of a few large importers. Such a situation is intolerable.

"For the sake of the millions of people in the oil states and in the industrial states whose economic welfare is very seriously affected by everything that affects the petroleum industry, Congress should give to this industry that security which can come only from definite legislation protecting the industry against an inundation of cheap foreign oil. Even though such an inundation might never come, the fact that the industry cannot be sure of this and that it has no positive security seriously affects its planning for the future and its continuance of exploration and development work to the great harm of any national industrial or economic program."

TEXAS COMMITTEE

New board's first session held at Austin Tuesday

Austin, Texas.—Initial session of the executive committee appointed by Jake L. Hamon, Dallas, new president of the Texas Division of the Mid-Continent Oil & Gas Association, to administer the business affairs of the body was held here February 18. The committee deferred action on the selection of an executive vice president and tax expert to be engaged in carrying out an active program during the current year. The board appointed special committees to start work on preparing a budget; launching of a membership drive and the collection of data to be used in resisting inequitable taxation.

The Texas division was reorganized at a general session of the membership held January 25 at Fort Worth. New staff of officers and directors were elected, and the selection of the executive committee was placed in the hands of the president.

Personnel of the new executive committee follows:

Jake L. Hamon, Ex-officio.....Dallas
W. H. Francis, Magnolia Petroleum Co. .....Dallas
E. H. Blum, Atlantic Oil Producing Co. .....Dallas
A. M. McCorkle, Stanolind Oil & Gas Co. .....Fort Worth
John R. Suman, Humble Oil & Refining Co. .....Houston
Hiram A. King, Sinclair Prairie Oil Co. .....Houston
T. E. Swigart, Shell Petroleum Corporation .....Houston
W. B. Pyron, Gulf Oil Corporation....Houston
Don Emery, Phillips Petroleum Co...Amarillo
J. R. Gahan, Tide Water Oil Co. ....Houston
E. M. Freeman, The Texas Company..Houston
John G. Pew, Sun Oil Company .....Dallas
R. H. Morrison, The California Co.....Dallas
J. A. Elkins, Pure Oil Company.....Houston
Freeman Burford, East Texas Oil Refining Company .....Dallas
Edwin M. Jones.....San Antonio
J. P. Shannon, Snowden & McSweeney Company .....Fort Worth
George Strake, Strake Oil Co. .....Houston
J. B. Bond.....Longview
J. F. Lucey .....Dallas
Jay Taylor, Halliburton Oil Well Cementing Co. .....Amarillo
George Morgan, Cardinal Oil Co...San Angelo
Marshall Young, West Central Texas Oil & Gas Ass'n.....Breckenridge
E. L. Smith, E. L. Smith Oil Co.....Mexia
Chas. P. McGaha, Fain-McGaha Oil Corporation .....Wichita Falls
Ray L. Dudley Gulf Publishing Co....Houston
E. B. Germany, C. & G. Oil Co.....Dallas

Secondary Recovery

ECONOMY OF PRODUCTION IS THEME OF WICHITA MEETING

By WARREN L. BAKER

WICHITA, KANSAS, FEB. 21.

TWO conclusions may be drawn from the annual meeting of the Division of Production of the American Petroleum Institute held in Wichita, February 20 and 21. First, definite efforts are being made to obtain improved operating efficiency and economy by better adapting of machinery to particular service requirements. Second, there is a growing interest among production men in secondary or artificial producing practices and their affiliated problems. Papers discussing subjects falling into the classifications of secondary producing methods dominated the meeting. However, throughout these and the other topics discussed were hints and ways and means of promoting more efficient and economical operation.

Papers devoted to practices employed after natural flow has ceased included discussions of such subjects as: the individual pumping unit and its engine power; gas repressuring; sucker rod loads, and Oklahoma City production methods. For the most part these papers described trends in the design of equipment and the subsequent hook-up of the units to best adapt them to operating conditions.

J. S. Montgomery, Phillips Petroleum Company, Bartlesville, told the assembly production men that the trends of surface pumping equipment in Mid-Continent fields today are little or no different from those used in the advent of pumping, except that there has been improvement in design and in the efficiency of equipment. Since the principle has changed little, he dealt with the transition that is taking place at this time.

The topic of his paper was "The Individual Pumping Unit and Its Engine Power." The unit type of pumping equipment is becoming quite popular, due largely to its low initial investment and high salvageability. These units may be classified in three groups of drives: gears, chains and belts. All which are giving good service in practically every case. There is no doubt that the unit type of pumping equipment has become a permanent method. However, proper application of these units must be considered in order to be assured of their success. The application and rating of pumping units depend to a large degree upon the type of prime movers, therefore, the latter must receive careful study. The common practice now is to use multi-cylinder engines, which have pressure lubrication. The majority of the medium and and high speed engines in pumping service are operated with radiators which are designed to cool the engines under the most extreme conditions.

Gas Repressuring

Gas repressuring in eastern Kansas was discussed by N. M. Hutchinson, Empire Oil & Refining Company, Eldorado, Kansas. After five years experience, it is Hutchinson's opinion that the ultimate yield of the Bartlesville sand of many eastern Kansas leases may be increased 15 to 18 percent by air or gas injection. This would indicate an increased yield of approximately 30,000,000 barrels. Moreover, he stated that by using sufficient gas to partly restore the original formation pressure, ultimate recoveries of the Bartlesville sand in Kansas shoestring districts might be increased by 45 percent or 81,000,000 barrels more than normal production. The possibilities and importance of this process are therefore obvious.

At present there are not over 12 injection projects under way in the Bartlesville sand trends of eastern Kansas, the majority of which are air or gas drives and not repressuring. Hutchinson pointed out several interesting and important repressuring projects in the area, and urged the necessity for carefully planned operation.

In order to make the operation of many pumping wells economically possible, the sucker rods must be so highly stressed that almost no safety factor over their endurance limit is allowed, and an excessively high rate of failure prevails in many cases, stated John F. Eaton, Jarecki Manufacturing Company, and H. D. Collins, Gulf Oil Corporation, in a paper entitled "Dynamometer Tests Indicate Present Pumping Methods Subject Sucker Rods to Unnecessary Loads." They then spoke of dynamometer cards of rod loads after interposing a cushioning medium between the beam and the rods. These cards demonstrated that such cushioning, which permits the polished rod motion to vary from the beam motion, would moderate the load without loss of production. The conclusion reached from a series of tests was that further reductions in sucker rod loads and in fatiguing stresses could be obtained if the motion imparted to the rods at the surface could be so modified that polished rod velocities varied inversely as the load. In other words present surface pumping equipment forces the polished rod to conform to the motion of the walking beam, creating unnecessary and useless impulse and impact loads in the rods.

Fred A. Lichtenheld, Indian Territory Illuminating Oil Company, Oklahoma City, discussed present production methods at Oklahoma City which is a proving ground for wells of 6500 feet in depth. Six different methods are employed successfully in the area. Broadly stated, these may be listed as natural flow, gas-lift and various gas-lift devices, electrical submerged centrifugal pumps, pneumatic pumping cylinders, walking beam, and hydraulic submerged pumps. Although many of the methods have been advanced and the majority have seen changes, there is only one actually new method that has made its appearance at Oklahoma City in recent months. It is based upon hydraulic principles. Fluid is pumped down a string of 1¼-inch tubing causing a plunger to reciprocate. This plunger is directly connected to a second plunger, the suction of which opens to the well. Both cylinders discharge into 2½-inch tubing leading to the well head. Producing oil today from 6500-foot wells by mechanical methods with improved equipment has about the same elements of risk as when 4000-foot wells were produced by equipment then in use, concluded Lichtenheld.

In a paper, "Prime Movers for Drilling in the Mid-Continent," J. A. Niles, Stanolind Oil & Gas Company, and W. C. Dreyer, Westinghouse Electric & Manufacturing Company, stated that the trend in prime movers for drilling is toward better fuel economy and greater adaptability to operating requirements peculiar to drilling operations.

Fuel economy in steam rigs is being effected by the use of more efficient engines, feedwater heaters, and superheaters. There has been little or no change in alternating-current rigs. Engine-driven rigs are increasing in use, particularly in Mid-Continent areas where gas and water are not plentiful. Gas, gasoline and Diesel engines are in common use. A number of alternating-current engine rigs are in use. During the past year the direct-current rig driven by engines has come to the front faster than any other type.

Disposal of oil field wastes was discussed in two papers, by R. C. Mitchell and Marvin Lee. Both brought out that the problem has become a most important one and that much study should be devoted to solving it. The papers summarized the growth of the problem and the various practices being used in Kansas in overcoming the evil.

The geological possibilities afforded by western Kansas and eastern Colorado were discussed by L. C. Morgan in a paper prepared jointly with Boris V. Lerke. They stated that it was to be expected that now widely separated Kansas and Colorado production would be connected and that as drilling progressed westward deeper drilling would be required due to thickening of upper formations. They were of the opinion conditions were correct for the formation of oil bearing structures.

Officers Named

Officials for the coming year of the Mid-Continent District Production Division of the American Petroleum Institute will be L. McQuiston, Phillips Petroleum Company, Oklahoma City, chairman; G. A. Holloway, Lee C. Moore, Inc., Wichita, Kansas, vice chairman for Kansas; Oscar Hatcher, Ada, Oklahoma, vice chairman for Oklahoma; Max Mahaffey, Empire Oil & Refining Company, Pampa, Texas, vice chairman in charge of Mid-Continent

part of Texas; and Van Bennett, Derby Oil Company, Wichita, Kansas, secretary-treasurer.

The advisory committee will be headed by Ray Schaeffer, Empire Oil & Gas Company, Bartlesville, as chairman, and will consist of the following members: C. A. Daniels, Phillips Petroleum Company, Amarillo; T. J. Hamilton, Phillips Petroleum Company, Great Bend, Kansas; Mike Birmingham, Indian Territory Illuminating Oil Company, Oklahoma City; Andy Ritchie, McPherson Drilling Company, Wichita; Tom Johnson, independent operator, Wichita; John Laury, Anderson & Kerr, Oklahoma City; John Fromer, Marathon Oil Company, Oklahoma City; C. E. Wright, Indian Territory Illuminating Oil Company, Oklahoma City; H. D. Collins, Gulf Oil Corporation, Tulsa; Kenneth A. Covell, Pure Oil Company, Tulsa; Glenver McConnell, Shell Petroleum Corporation, Tulsa; L. E. Fitzgerald, Phillips Petroleum Company, Bartlesville; Matt Kerwin, Indian Territory Illuminating Oil Company, Bartlesville; Paul Hedrick, Tulsa Daily World, Tulsa; H. J. Kemler, Shell Petroleum Company, Wichita; C. S. Warren, Empire Oil & Refining Company, El Dorado, Arkansas; Harry Glover, Derby Oil Company, Wichita; Theo Morgan, Kansas State umpire, Wichita; Claude Barrow, the Daily Oklahoman, Oklahoma City; E. K. Anderson, Skelly Oil Company, Lyman, Oklahoma; J. G. Dyer, Continental Oil Company, Ponca City; W. C. O'Farrell, Standard Oil Company of Louisiana, Smackover, Arkansas; A. M. Ambrose, Empire Companies, Bartlesville; James Hewgley, Slick-Urschell, Oklahoma City; C. O. Rison, Indian Territory Illuminating Oil Company, Oklahoma City; Lewis List, El Dorado Refining Company, El Dorado, Kansas; J. J. Conry, Carter Oil Company, Tulsa; R. K. Huey, Deep Rock Oil Company, Tulsa; E. B. Smith, Magnolia Petroleum Company, Drumright, Oklahoma; L. W. McLeod, Westinghouse Electric & Manufacturing Company, Wichita; and P. L. Chapman, Stanolind Pipe Line Company, Ada, Oklahoma.

Washington.—Legislation lifting the processing tax from crude oil used in the manufacture of road oils was introduced in the House of Representatives February 20 by Congressman Caldwell of Florida.

The bill is designed to aid the domestic industry in meeting the competition of imported oils by relieving it of the tax on crude used in the production of road-making materials. All other crude, however, would continue under the tax.

HUMBLE DIVIDEND

Houston, Texas.—Humble Oil & Refining Company directors February 17 declared the regular quarterly dividend of 25 cents a share, payable April 1 to stockholders of record March 2. There are about 9,000,000 shares of this common stock.

Show Need of Reserves

ENGINEERS REITERATE NEED FOR FINDING MORE SOURCES

By WM. V. GROSS

NEW YORK, Feb. 21.

ADDITIONAL world reserves of 15,000,000,000 barrels of crude oil are needed for the next 10 years. This was the estimate set by V. R. Garfias and Raymond V. Whetsel before the annual meeting of the American Institute of Mining and Metallurgical Engineers, February 19.

This need was predicated on an estimated world consumption of 1,700,000,000 per year for this period.

Garfias is manager of the foreign oil department of Henry L. Doherty & Company, New York, and Whetsel is general manager of Compania de Gas Combustible Imperio, Tampico.

The paper of Garfias and Whetsel, read by L. C. Snider, geologist for Doherty interests, placed the proven world crude oil reserves at slightly less than 22,000,000,000 barrels and called specific attention to the fact that this figure represented only oil in sight and recoverable by methods now in use and at cost figures permitting economic operation. It did not represent possible or probable reserves.

New Fields Needed

The authors brought out that the reserves on hand theoretically can supply a total yearly demand of 1,600,000,000 barrels for 14 years, but that in actual practice the discovery of new fields is essential if a shortage is to be averted, particularly in the United States. The United States consumes 60 percent of the world's production, and probably will continue to do so for some time to come, the authors believe.

They expressed an opinion that reserves outside of the United States are, generally more economically and more rationally developed.

The same authors prepared a companion paper, "Petroleum Consumption in 1935," in which they estimated world consumption of petroleum in 1935 at 1,592,000,000 barrels, or 5.4 percent higher than in 1934. World production in the past five years has exceeded world demand by 239,000,000 barrels. During this period, the United States share of the excess crude production was 134,000,000 barrels. Withdrawals from storage in the United States in 1935 were 50 percent less than in 1934, and the authors drew the inference from this that the United States could not afford to let up on curtailment of drilling and production in proven areas.

Reserves by Countries

Expressed in barrels of 42 gallons, Garfias and Whetsel designate known crude oil reserves of leading nations of the world for January 1, 1936, as:

United States	10,575,000,000
Russia	2,830,000,000
Iraq	2,475,000,000
Iran	2,150,000,000
Venezuela	1,350,000,000
Roumania	633,000,000
Dutch East Indies	450,000,000
Mexico	420,000,000
Colombia	275,000,000
Peru	138,000,000
British India	111,000,000
Argentina	92,000,000
Trinidad	91,000,000
Other countries	375,000,000
Total	21,965,000,000

Comment on the two papers brought this statement from William B. Heroy, New York, geologist of Consolidated Oil Corporation:

"We have approximately 10 years supply of proven oil in the United States. We should not go about trying to find too many new reserves so long before we need them."

In this connection, Professor Gerard

NEW PRESIDENT A. I. M. E.

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JOHN M. LOVEJOY

L. Hassler, Pennsylvania State College, expressed an opinion that political support would be given the manufacture of synthetic fuels in this country as it had in others and that the manufacture of synthetic fuels would drive the oil industry out of business before crude reserves are exhausted.

California Situation

Hallan N. Marsh, newly elected chairman of the petroleum division, read before the Wednesday morning session a paper on the California situation by V. H. Wilhelm of The Texas Company and W. H. Miller. California's reserves, according to the paper, are rapidly declining and new additions thereto in 1935 have been small, however, producers are anticipating a price increase which will stimulate wildcatting. Wilhelm and Miller expressed a belief that the 10,000-foot well in California will not be practical until oil sells for $3 per barrel. The two important technical advances made in California consisted of the broad acceptance of directional drilling and the wide adoption of pressure bombs for determining productive ability of a well.

Kentucky was represented in the symposium by a paper prepared by Coleman D. Hunter, explaining that Kentucky's increase in production in 1935 was due to application of new producing methods and development of the Fordsville area in Ohio County, which produced 5,224,000 barrels in 1935 and should increase production in the eastern part of the state in 1936 through repressuring. While the old oil fields in Kentucky are showing a serious decline in output, the Kent gas area continues to hold its own rank as one of the leading natural gas areas in the country.

Professor Benjamin Craft opened presentation of his paper on Louisiana with the statement that it looks as though Rodessa will have a long production life and that it is possible the upper gas sands in that field may later produce oil.

"It does not look like the Texas production of the Rodessa field will be very large," he said. He stated the recent Lincoln Parish discovery in the salt dome area may correlate with the upper gas sand at Rodessa. In speaking of the general area between these two spots, Professor Craft said, "I see no reason why we can't have several new fields there in the next year, though I doubt if we shall get production out of the upper Cretaceous."

In speaking of the new La Fitte field in South Louisiana, the deepest production in South Louisiana, the author declared: "Those wells are apparently going to result in an excellent field."

Cheneyville, a recent find, was designated Louisiana's first Conroe trend field.

With further reference to the Conroe trend in Louisiana, Professor Craft stated that if you defined the trend as any place where the Conroe sand could be found at from 1000 to 10,000 feet, its path through Louisiana would be about 100 miles wide. There has not been done much geophysical work on the trend in Louisiana.

New sands were discovered in 15 old fields in Louisiana during 1935, Professor Craft stated. In discussion on his presentation he expressed an opinion that water in Rodessa field is coming from little sand lenses.

California is not a member of the Interstate Oil Compact Commission and the compact cannot become completely effective until it is a member and has an effective conservation law, Northcutt Ely, attorney, Washington, D. C., told those assembled at the economic symposium of the Petroleum Division February 20, in his paper, titled "Federal and State Petroleum Regulation." Ely told the engineers that in view of the supreme court decisions the problem of the oil industry today is not whether federal or state governments ought to regulate oil production, but whether it can make devices available under the constitution for conservation of the nation's oil resources. The compact, already ratified by Texas, Oklahoma, Kansas, New Mexico, Colorado, and Illinois, and approved by congress, is the mechanism now at work, he stated.

Four Elements

Ely outlined the compact as having four elements:

(A) Some governmental authority is necessary for maximum recovery of oil and gas from a reserve if the reservoir energy is to be efficiently and equitably used by various owners of the pool;

(B) The state possesses the police power necessary to protect correlative rights of owners of the pool and the public interest;

(C) States should co-operate so that orderly production in one state is not penalized by uncontrolled production in another state. (D) The federal government should help the states by preventing movement of illegal oil, controlling imports, and making findings of facts and forecasts as to supply and demand for the assistance of the compact commission and the state governments.

"Three things can happen to the compact," Ely said, "now that fear of federal control has subsided the industry may let the compact fall to pieces, or, the compact system can take strong root and do many of the things for the protection of irreplaceable reserves that the ad-

Officers of A. I. M. E. Petroleum Division

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L. L. FOLEY
Vice Chairman Production Engineering

vocates of federal control have insisted were their own objectives. Or, the compact may be overshadowed by an unexpected resurgence of the demand for federal regulations.

"The movement for greater federal control of the oil business has not run its course," he added. "Future neutrality legislation might form the basis for regulations carrying the federal government's supervision of the oil business deeper than it has yet gone.

"A dozen years ago, we came out of a period of supposed scarcity into one of very high immediate potential production. Apparently we are going to face, sooner, or later, a period in which new discoveries are going to be welcomed, and when diminishing reserves plus increasing state taxation make the motorist begin to realize his stake in the oil business, there is going to be intense public interest in the industry and in ways to make it furnish more gasoline and more taxes."

1936 Forecast

Fred Van Covern, director of the department of statistics of the American Petroleum Institute, was the first speaker of the afternoon before the economics symposium, opening his talk with the statement that 1936 is going to be a difficult year for forecast, he said, in informal discussion along with presentation of his paper, "Trend of Consumption, Production, Exports and Imports of Petroleum."

"Gasoline stocks are too high. Refiners have been running too much crude. Motor fuel demand has been seriously effected by an excess of bad weather. Fuel oil stocks are declining," were statements made in picturing the situation prior to reading his paper.

Following presentation of Van Covern's paper, Joseph E. Pogue, consulting engineer of New York, who presided, said: "I think the industry will produce and run more oil than Mr. Van Covern indicates." Whereupon Van Covern replied: "I am not trying to forecast what the industry will do, but rather am trying to set up an ideal situation."

The question was raised in discussion as to whether the nation could produce 2,900 000 barrels per day without physical waste. Van Covern was of the opinion it could, but ended his reply to the question with a final statement that he thought imports may constitute the ultimate salvation of the American producer.

Proration and Price

Joseph E. Pogue's paper, "The Role of Drilling in the Functioning of Proration," contained this:

"The practical problem before the industry in its new status is the maintenance of equilibrium, with planned control of crude oil production substituted for competition and price as the regulatory mechanism at one point in the supply-demand system."

He explained that the purpose of his paper was to show the effect of unregulated drilling on the orderly functioning of proration. The paper, consisting mainly of the interpretation of a graph and a schematic drawing, contended the following points:

Price still affects demand but influences current supply only through its bearing on proration, drilling and search. Proration has been substituted for price as a throttle at the well head, but at this point only. A declining price stimulates demand and the effective operation of proration and retards development and wildcatting. A rising price does the reverse.

Price Influences

"The petroleum industry can influence demand only through price and quality; it cannot regulate demand," Pogue explained. "Demand, therefore, is determined by competitive conditions and can only be affected by proration adversely. Price is restricted by the strength of proration, rising prices being stimulative to evasion thereof." Pogue contended the developed, or drilled up, reserve is the primary factor underlying current supply, adding, "Proration evolved when this factor became excessive, in order to throttle back the surplus potential. An excessive rise in the potential would doubtless again undermine proration and wreck the price structure. There is a high degree of correlation between the price of crude oil and the number of oil wells drilled, so that it is evident that drilling is quite responsive to price and fluctuates with variations in price. Price is accordingly an effective regulator of drilling. Should proration be employed to valorize crude oil, the stimulating effect of price upon drilling, unless means are found for its inhibition, would normally lead to disequilibrium and breakdown of the price structure.

Aids to Proration

His paper closed with the following provisions for a program of effective support for proration:

(a) Furtherance by the petroleum industry of a consistent policy of relatively low oil price so long as potentials are large and the discovery rate shows any tendency to exceed the discovery rate; so long, too, as maximum demand is a desideratum in maintaining balance.

[*Continued on Page 66*]

Elect Lovejoy

MARSH IS NAMED CHAIRMAN PRODUCTION DIVISION

New York.—John M. Lovejoy, president of Seaboard Oil Company, New York, was elected president of the American Institute of Mining and Metallurgical Engineers at the business meeting February 18. Hallan N. Marsh, petroleum engineer with General Petroleum Corporation, Los Angeles, was chosen chairman of the Petroleum Division at the annual dinner February 20.

Lovejoy has been a member of the institute since 1916. He was graduated in 1911 from the Columbia School of Mines. Following mining experience in South America, he became a geologist for Standard Oil Company in China. He returned to this country and did work in Wyoming. After seeing service during the World War as a captain of field artillery, he joined Amerada Petroleum Corporation as a geologist and was promoted to vice president. Later he was president of Petroleum Bond and Share Company, from which he joined Seaboard Oil Company as president.

Other officials elected for the petroleum division are M. Albertson, Shell Petroleum Corporation, Houston, vice chairman, and Eugene A. Stephenson, Missouri School of Mines, Rolla, secretary and treasurer.

Members of the executive committee of the Petroleum Division, of which Marsh is chairman, are George B. Corless, Houston, superintendent of drilling, Humble Oil & Refining Company; Harry C. Fowler, Washington, United States Bureau of Mines; C. V. Millikan, Tulsa, Amerada Petroleum Corporation; Harry H. Power, Tulsa, Gulf Oil Corporation, and Ben K. Stroud, Los Angeles, Oil Well Supply Company.

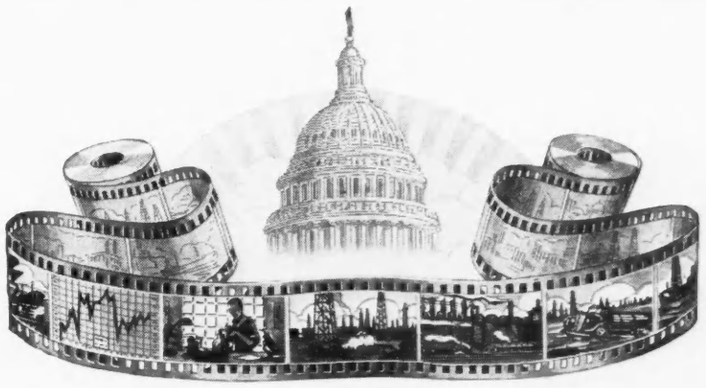
L. L. Foley, Marathon Oil Company, Tulsa, was named vice chairman of the Production Engineering Section. Associate vice chairmen for this section are Robert E. Allen, Los Angeles, assistant California umpire; John S. Ivey, Houston, United Production Corporation; Carl E. Riestle, Jr., Kilgore, field chairman of the East Texas Engineering Association, and W. C. Shutts, New York, Standard Oil Development Company.

The vice chairman for the Section on Production, J. Terry Duce, The Texas Company, New York, was reelected, as was his assistant, Benjamin C. Craft, professor of petroleum engineering of Louisiana State University, Baton Rouge.

J. T. Hayward, Barnsdall Oil Corporation, Tulsa, was chosen vice chairman for the engineering research section. Others reelected are Sidney A. Swensrud, Cleveland, assistant to the president, Standard Oil Company of Ohio, vice chairman for economics; Walter Miller, vice president, Continental Oil Company, Ponca City, vice chairman for refinery engineering; Earl Oliver, engineer of Ponca City, chairman of the stabilization committee.

Vice presidents of the Institute are Roland C. Allen of Oglesbay, Norton & Company, and Henry Krumb, consulting mining engineer. The five directors who were chosen, several of them for second terms, include Eli T. Conner, coal mining engineer, of Scranton, Pa.; John L. Christie, metallurgist, Bridgeport, Connecticut; Selwyn G. Blaylock, vice president of Consolidated Mining & Smelting Company, Trail, British Columbia, Canada; Frank L. Sizer, mining engineer, San Francisco, California, and William B. Heroy, oil geologist, of New York. Heroy is president of the American Association of Petroleum Geologists.

The Changing Panorama



THE OIL WEEKLY'S COMPOSITE VIEW OF INDUSTRY

Edited by L. J. LOGAN, Associate Editor

RECENT weeks have tended to dispel any doubts that may have lingered as to the oil industry's favorable position and outlook. In the middle of the hardest winter of the century prices of crude oil and gasoline were advanced. And despite the subsequent highly adverse motoring conditions, the higher prices have stuck. These new prices are the best for over five years, or since late 1930. They are such as to afford opportunity for profit for all branches of the industry, from well to service station.

Furthermore, this remarkable performance of the markets in mid-winter gives promise of even higher prices and more profitable operations ahead. It does not appear over-optimistic to expect further moderate gains in prices of both crude and products a few months from now, when increases would be supported by the usual rising consumption of spring and summer.

Various Factors Behind Good Outlook

With the difficulties, low prices, and losses or small earnings of the depression years fresh in the memory, it is somewhat difficult to realize that the oil industry finally has emerged into a position that is definitely satisfactory, with current operations profitable and prospects even better.

It is not difficult, however, to explain how this present situation has come about.

The existing state of affairs is the result of a combination of favorable circumstances, some promoted by outside forces and some by the industry itself.

Three circumstances, in particular, have been conducive to a desirable situation. In the first place, petroleum consumption has been remarkably heavy, and demand still is increasing, with unprecedented requirements in prospect for 1936. Secondly, there has been a lessening of the disturbing influence of new fields, as recent discoveries have not been unusually menacing, while East Texas and other older fields have become more settled. In the third place, a favorable situation has been brought about in considerable part by the production curtailment that the industry has practiced long and consistently, with the support of the governmental agencies; the result of this restraint being that above-ground stocks of all oils are the lowest for nearly a decade.

Further Improvement Promised

Sketched in broad outline, therefore, the present picture in oil is one in which producers, refiners, and marketers are profiting tangibly by doing comparatively large volumes of business at reasonably attractive prices.

It seems quite likely, moreover, in view of the favorable surrounding circumstances, that as the picture changes in the months ahead, it will assume an even brighter aspect, with still better profits accruing through further expansion of business volume and additional improvement of prices.

Earnings Continue to Increase

So far this year, earnings in the oil industry have measured up to the more optimistic expectations, with results substantially better than in the similar period of 1935, and highest since 1930.

Since about January 10, crude oil prices have been five to 15 cents a barrel higher than they were throughout 1935, except in California. The present crude postings are the best for more than five years, although still materially under the prices that prevailed up to the market break of October 16, 1930. Mid-Continent 36 gravity crude, for instance, now $1.10 a barrel, was priced at $1.29 a barrel prior to October 16, 1930, when it dropped to 95 cents per barrel.

Product Prices Better

Product prices this year have shown even greater improvement than crude prices, as compared with the early part of 1935. This statement is particularly true as regards prices at refineries. The gasoline tank car prices are much improved over the levels of a year ago, and are the highest since November, 1930, or for a period of five years. This means that the refining branch of the industry has been in position to show profit the early part of this year, whereas prices

and earnings were unsatisfactory in the similar period of 1935.

Retail prices also have been better in the opening portion of 1936 than in the corresponding period of 1935, being the highest since late 1930. Consequently, the marketing companies and departments have had higher earning power this year, although the improvement has not been as great for them as for the refining concerns and divisions.

Whole Industry Now on Sound Basis

A year ago the producing branch of the industry was enjoying fairly satisfactory results, while both the refining and marketing branches were not. Now the latter two branches also are obtaining profitable prices, while the producing branch has had moderate improvement. As a whole, therefore, the industry is in much improved position. Not only are all the divisions receiving better prices, but they also are handling more oils. The opportunity for profit is therefore doubly improved.

Demand High Despite Weather

The severe weather of the past two months has interfered perceptibly with the traffic of motor vehicles and thus with consumption of gasoline. But even so, the total demand for gasoline has exceeded earlier expectations, running well ahead of the early part of 1935. For January, 1936, the gasoline demand was 10 percent greater than in January, 1935, although that sharp increase was partially due to the fact that the January, 1935, demand was sub-normal, following in the wake of low prices and heavy buying in the closing months of 1934. For the first quarter of 1936 the American Petroleum Institute has estimated that the domestic demand for motor fuel will be 8.1 percent greater than in that period of 1935. Since last year's demand set a new record, an unprecedented demand is expected for 1936.

While the bad weather of this winter has somewhat held down gasoline consumption, it has compensated partially as regards the petroleum industry by stimulating the demand for fuel oils. The fuel oil demand was improved further, meanwhile, by increased installations of oil burners in houses for heating purposes, 1935 having brought the number of such installations to record levels. The cold weather and the greater number of oil burners naturally have promoted a firm market for fuel oils, at comparatively high prices. The fuel oil prices have advanced in recent weeks.

1936 Earnings May Equal 1930 Results

In view of the results in the first two months of the year and the existing combination of favorable circumstances, it seems quite possible that earnings in the oil industry in 1936 may rise back around the level of 1930. The 1930 earnings were the best in the history of the industry, with the exception of the record results achieved in 1929.

Already the prices of oils are better than in the closing months of 1930, and they currently are expected to advance further within a few months, or to levels comparable with those prevailing earlier in 1930. Thus the average prices for 1936 promise to compare favorably with those for 1930. And the consumption is expected to be higher for 1936 than for 1930. It is indicated, therefore, that 1936 will compare favorably with 1930 both as to prices and as to volume of business.

Greater Demand Seems Assured

The greater consumption for 1936 appears rather definitely assured, since the recovery forces continue to manifest themselves. The automotive industry confidently expects further gains, indicating that gasoline consumption is due to show further increase. Similarly, further gains in demand seem assured for other petroleum products, such as lubricants for the industrial world and asphalt and road oils for construction work and road building.

Better Prices Depend on Control

Concerning the possible further gains in prices of oils for 1936, there is, of course, less assurance. A few new major oil fields, added to existing flush areas, quite conceivably could upset the apple cart in a hurry. In the industry's past, rosy pictures have been so spoiled by flush fields.

It seems reasonable, however, to hope that the 1936 picture will not be marred in such manner. At present the United States crude oil production continues reasonably in line with demand.

After some months of overproduction, California in recent weeks has sharply curtailed output. Some additional reduction would bring the production down to market demand and would meet the conditions fixed by the major purchasers as a requisite for raising crude prices in the state.

Rodessa, mostly in northern Louisiana, but also partially in eastern Texas, is developing into a major oil field, and has given rise to some fears of overproduction. It has been feared, in particular, that proration complications might arise from the fact control will be partially in the hands of Louisiana authorities and partially under Texas officials. However, the agencies of the two states have been cooperating with each other, and probably will continue to do so. And so far the Rodessa production has not been alarming.

Past Year Brought Gains

Although only a few of the oil companies have issued annual statements covering 1935 operations, it is indicated that the earnings will be substantially better than in 1934, in the aggregate. Such improvement is indicated by the circumstances that demand was greater in 1935 and that prices were better, particularly in the latter half of the year.

Improved earnings for 1935 are actually attested, moreover, as regards a few companies. Union Oil Company of California, for instance, among the first to issue annual statements, reported net profit of $1.15 a share in 1935, compared with 66 cents in 1934, a gain of 74 percent. Tide Water Association Oil Company is understood to have had the largest net profit since 1930, unofficial estimates indicating net of about 70 cents a share on the common stock for 1935, against 35 cents a share for 1934 after allowing for preferred dividends. An official statement regarding 1935 operations of Humble Oil & Refining Company embodied the assertion that "the year has been satisfactory and the company's operations will show a conservative net earning." Pure Oil Company earnings for 1935 have been officially estimated at $1.99 a share, compared with a net loss in 1934. Sun Oil Company has reported net profit of $7,100,239 for 1935, compared with $6,650,464 in 1934. Atlantic Refining Company earnings for 1935 have been officially estimated at $1.49 a share, compared with $2.07 per share in 1934, but earnings in 1935 were substantially better in the latter part of the year.

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MEN IN THE INDUSTRY'S NEWS

ADOLPH DOVRE, geologist with the Tide Water Oil Company, San Antonio, was elected president of the San Antonio Geological Society at the annual election February 17. He succeeds Joe M. Dawson, Gulf Production Company, San Antonio, who will serve on the executive committee. W. G. Kane, of Saltillo, Coah., Mexico, was elected vice president. Harry Nowlan, of the Darby Petroleum Company, San Antonio, was elected secretary and treasurer. W. K. Esgen, Humble Oil & Refining Company, San Antonio, was elected to the executive committee.

J. S. MERIWETHER, formerly connected with Gulf Refining Company, has been added to the scouting department of Shell Petroleum Corporation, and will be located in the Midland district, West Texas.

E. E. SWOPE, assistant general manager of refineries for Magnolia Petroleum Company with headquarters at Beaumont, has succeeded the late E. E. Plumly as general manager of refineries. John W. Newton, former assistant superintendent of the company's Beaumont plant, will fill the vacancy resulting from the promotion given Swope.

D. L. FRAWLEY, vice president of Barnsdall Oil Company, was a recent Mid-Continent visitor from Pittsburgh, Pa. An inspection of the company's newly acquired interests in the Oklahoma City pool was made in company with D. R. Snow, vice president in charge of production: George A. Schwab, head of the land department, and A. E. Jordan, head of the lease department.

DALE BENSON, assistant geologist in the Texas Panhandle for Sinclair Prairie Oil Company, has been transferred from Amarillo to Corpus Christi. He is succeeded by Don Benson, formerly with Deep Rock Oil Corporation, at Ada, Oklahoma.

H. O. SCHWENK, formerly in the engineering department of Great Lakes Pipe Line Company, is now field engineer for Nickles Machine Shop, Inc., of Ponca City.

C. W. CURRY, director of industrial relations for Standard Oil Company of Indiana, Chicago, was in Tulsa Monday, February 17, on which date representatives of the employes of Stanolind Pipe Line Company in five states were present for a conference with officials whose headquarters are in Tulsa.

F. S. "TAS" WILLIAMS, geologist in the McPherson, Kansas, district for W. C. McBride, Incorporated, since 1929, has been transferred to Tulsa where he will be in charge of geologic work in Kansas and Oklahoma. He succeeds Tom C. Heistand who recently resigned to become a member of the geological staff of Indian Territory Illuminating Oil Company.

G. V. D. MARX, Standard Oil Company of California, San Francisco, has been appointed national chairman of the Topical Committee on Production Technology of the American Petroleum Institute's Division of Production. The appointment was made by T. V. Moore, Humble Oil & Refining Company, Houston, chairman of the Central Committee on Drilling and Production Practice, who has announced also the appointment of the following district chairmen:

California District: H. C. Pyle, Union Oil Company of California, Los Angeles; Eastern District: Morris Muskat, Gulf Research & Development Corporation, Pittsburgh; Rocky Mountain District: F. E. E. Germann, University of Colorado, Boulder, Colorado; Southwestern District: F. E. Heath, Sun Oil Company, Dallas; Mid-Continent District: H. H. Power, Gypsy Oil Company, Tulsa; and Foreign District: Joseph A. Holmes, Jr., Lago Petroleum Company, Maracaibo, Venezuela.

K. B. Barnes, Gypsy Oil Company, Tulsa, has been appointed chairman of the Mid-Continent District Sub-Committee on Saturation Tests.

JOHN S. REDFIELD, assistant to R. J. Riggs, head of the research department and consulting geologist for Stanolind Oil & Gas Company, is the new editor for the Tulsa Geological Society. He succeeds Tom C. Heistand, who recently went to Bartlesville to become associated with Indian Territory Illuminating Oil Company. Redfield is a geological graduate of the University of Oklahoma and a former member of the Oklahoma Geological Survey.

R. T. LYONS, vice president in charge of the division of lands and leases for Skelly Oil Company, left Tulsa during the week to make a wide swing through the Texas areas which are under active exploration campaigns.

GEORGE A. KROENLEIN, consulting geologist, Carlsbad, New Mexico, was a business visitor in Dallas the past week.

T. R. COWELL, director of Plymouth Oil Company, Pittsburgh, and a vice president of Transcontinental Oil Company prior to its merger with Ohio Oil Company, died February 14 at John Hopkins Hospital, Baltimore. He had maintained residence in New York City and Palm Beach, Florida, in recent years. Burial took place at the latter city, February 18.

L. D. HILTON, sales manager, Cameron Iron Works, Inc., Houston, recently completed a field trip which took him to California, through the Rocky Mountain States and the Mid-Continent territory.

GEORGE BUCHANAN was the speaker at the Houston Geological Society's regular weekly meeting February 20, and discussed the geology of the Cheneyville field, Rapides Parish, Louisiana.

E. T. DeARMAN, Tyler operator with holdings in the East Texas field, sustained painful injuries and his wife was hurt internally February 15, when their automobile and a truck figured in an accident near Gainesville, Texas.

HARRY W. BASS and H. H. Champlin, Dallas drilling contractors and producers, have organized Cayuga Supply Company to operate an oil field specialty equipment store in the Cayuga field, south central Texas.

GUY MILLER, paleontologist for Shell Oil Company, has returned to headquarters at Long Beach, California, after spending several weeks at the Houston office of Shell Petroleum Corporation.

DIED:

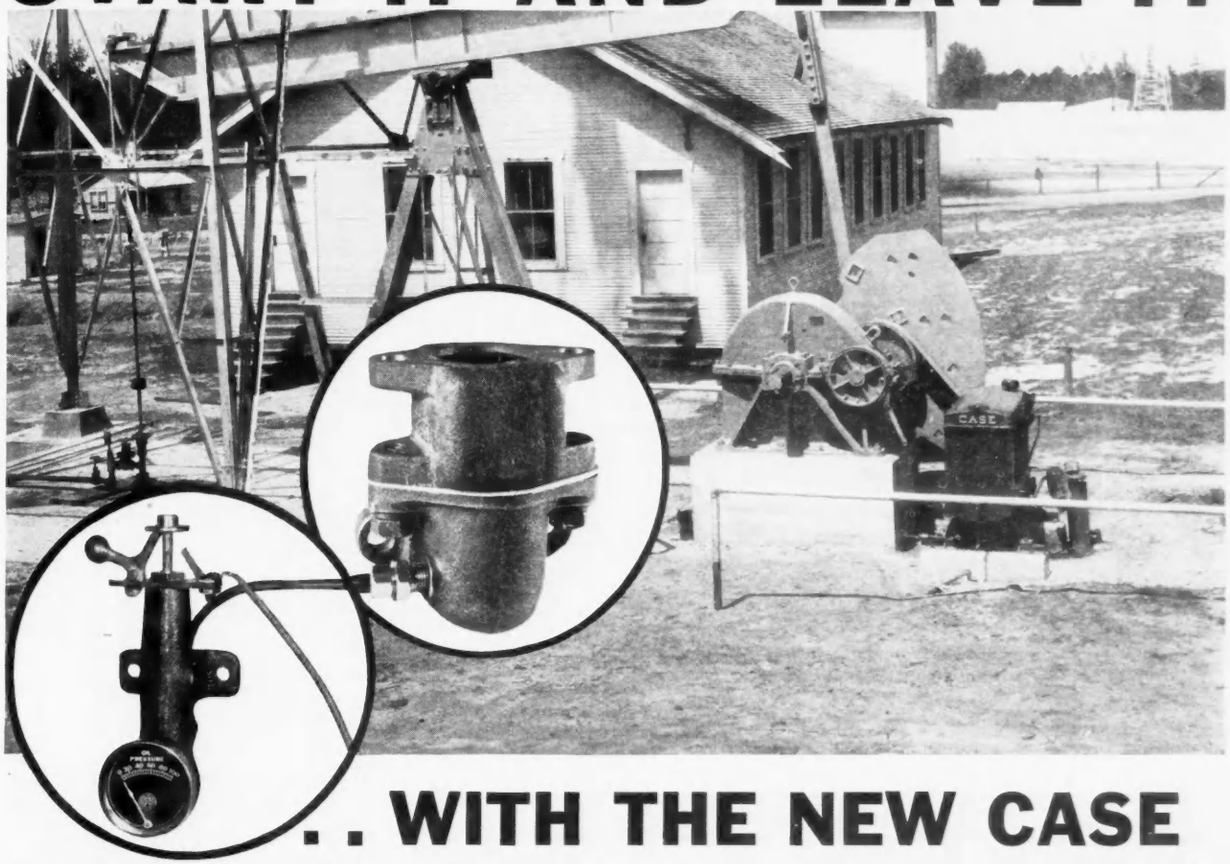
W. S. MOWRIS, chairman of the board of Venezuela Petroleum Company and director of foreign exploration and drilling for Consolidated Oil Corporation, died at his home in New York February 12. He was 68 years old. Born at Warren, Pennsylvania, his career in the oil business was from childhood. He was an early associate of T. N. Barnsdall and drilled the first oil well in Kansas. After moving their wildcat operations to Oklahoma, this partnership was terminated and Mr. Mowris joined with Harry F. Sinclair and the late Pat White in organization of Sinclair Oil & Gas Company. In 1916, Mr. Mowris became manager of drilling operations for the Sinclair organization and that work took him to all countries where the organization was active.

RAY G. POLAND, pioneer independent oil man of Ardmore, Oklahoma, died on Friday, February 14, from injuries sustained in an automobile accident near Texarkana, Texas, two days before. Poland had lived in Ardmore for more than 25 years and was well known to the industry of the southern part of the state.

GEORGE LINDSEY CULVER, 29, president of Culver Oil Company, Gladewater, Texas, was killed February 16, when his new plane went into a spin and crashed near his residence in Dallas. He developed producing properties in the East Texas field, and until recently operated two refineries.

WILLIAM PARKER DUCK, 37, member of drilling crew on Olson Drilling Company's deep wildcat project on the Preston Anticline near Pottsboro, North Texas, was decapitated February 16, when a wire line parted. The body was forwarded to Saltillo, Tennessee, for burial.

START IT AND LEAVE IT



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CASE

GEOLOGISTS PROGRAM

Associate bodies meet at Tulsa March 19-21

Tulsa.—Tentative plans for the twenty-first annual meeting of the American Association of Petroleum Geologists, to be held here on March 19, 20 and 21, were released during the week through Richard T. Lyons, Skelly Oil Company, chairman of the publicity committee. The technical program will be handled in three simultaneous sessions which will include also members of the Society of Economic Paleontologists and Mineralogists in their tenth annual meeting, and members of the Society of Petroleum Geophysicists in their seventh annual meeting. In addition to the technical program the following special features will be included: Thursday night, March 19, a smoker following a talk by a geologist of national prominence; Friday night, March 20, annual dance and banquet at both the Mayo Hotel, which is general headquarters, and the University Club; and following the convention, a field trip through the Ada district and the Arbuckle Mountains.

Geologists of Carter Oil Company are preparing papers on the Fitts and South Burbank pools and geologists of Gulf Oil Corporation are preparing a paper on McElroy 103, a test which holds the drilling depth record and which was located in Crane County, Texas. An important part of the program will be the discussion of developments in the various oil producing areas of the world. Geologists from the different areas will present papers which will include a discussion of the geology of important pools discovered during the past year, a discussion of important developments in old pools, and a discussion of the areas now being explored. The tentative programs of the three societies are announced as follows:

American Association of Petroleum Geologists

A. I. Levorsen—Presidential address.

N. W. Bass, Constance Leatherock, W. R. Dillard and L. E. Kennedy—"Characteristics and Origin of the Bartlesville and Burbank Sands in Osage and Kay Counties, Oklahoma, and in Cowley, Butler and Greenwood Counties, Kansas."

Charles E. Decker—"Some Tentative Correlations on the Basis of Graptolites in Oklahoma and Arkansas."

Robert H. Dott—"Some Pennsylvanian Correlations in East-Central Oklahoma."

Darsie A. Green—"The Pre-Marlow Permian of Central Oklahoma."

Glenn Grimes—"Revision of the Pennsylvanian-Permian Contact on the North American Continent."

Wallace Lee—"Mississippian Limestone of Kansas."

S. W. Lowman—"The Central Oklahoma Uplift."

H. S. McQueen—"Pre-Mississippian Structural History of the Ozark Uplift of Missouri."

Frank A. Melton—"Fractures in Hard Strata Above the Oklahoma City Structures."

Joseph E. Pogue—"Economics of Crude Oil Prices."

C. W. Tomlinson—"Some Structural Features of the Arbuckle Mountains and Criner Hills."

Theron Wasson—"Oil and Gas Fields in Michigan With Particular Reference to Recent Developments."

Henry V. Howe—"Stratigraphic Evidence for Gulf Coast Geosyncline."

R. W. Richards—"Significance of Wet, Lean and Dry Gas in the Absence or Presence of Petroleum Deposits."

Josiah Bridge, T. A. Hendricks and M. M. Knechtel—"Geology of the Black Knob Ridge, Oklahoma."

T. A. Hendricks, C. H. Dane and M. M. Knechtel—"Stratigraphy of Pennsylvanian Rocks of the Arkansas-Oklahoma Coal Basin."

Parker D. Trask—"Studies of Some Possible Source Beds in Oklahoma and Kansas."

R. B. Rutledge—"The Cunningham Pool, Kingman County, Kansas."

Watson Monroe—"Factors Affecting the Geologic History of the Jackson Area of Mississippi."

John Emry Adams—"Oil Pool of Open Reservoir Type."

W. B. Lang—"The Stratigraphy of the Permian Rocks in Southeastern New Mexico."

Basil B. Zavoico—"Recent Developments in the Oil Fields of U. S. R. R."

Michael T. Halbouty—"High Island Salt Dome, Galveston County, Texas."

George C. Branner—"Sandstone Porosities in the Paleozoic Region of Arkansas."

D. D. Utterback and W. V. Howard—"Bituminous Limestones and Sandstones."

W. W. Love and W. V. Howard (by title)—"Experimental Evidence on Migration of Petroleum."

Frederick G. Clapp—"Geology and Oil Indications of the Dead Sea."

R. Claire Coffin (by title)—"Peculiarities in the Distribution of Oil and Gas in the Fields of the Rocky Mountain Region."

Robert Roth—"Notes on the Base of the Custer."

Harry H. Nowlan—"Discussion of Geology of New Discoveries, Development in Older Pools and in Active Wildcat Areas in San Antonio District."

Orval L. Brace—Same as above for Gulf Coast area.

Hal P. Bybee—Same for West Texas and Southeastern New Mexico.

H. R. Van Gilder—Same for Appalachian area.

Edward F. Shea—Same for Oklahoma.

Wallace Ralston—Same for East Texas.

Papers will be presented also on California, Northern Louisiana, Southern Arkansas, Kansas, North Texas, Texas Panhandle, Rocky Mountain and foreign areas.

Society of Economic Paleontologists and Mineralogists

W. F. Twenhofel—Presidential address, "Marine Unconformities, Marine Conglomerates and Thickness of Strata."

M. M. Kornfeld—"Use of Corals in Jackson Eocene Well Cuttings."

C. E. Decker—"Graptolites of the Stringtown Shale and Basal Viola Limestone of Oklahoma and Womble Shale of Arkansas."

C. E. Decker (by title)—"A Lower Ordovician Graptolite Fauna at Smithville, Arkansas."

C. E. Decker (by title)—"A Cambrian Graptolite Fauna in the Middle Arbuckle of Oklahoma."

R. W. Harris—"Additional Ostracods From the Simpson and Arbuckle of Oklahoma."

L. W. Callahan and H. L. Durgan—"Micro-Fossiliferous Zones in an Eocene-Oligocene Well Section of Northern Mexico."

Alice Quesenbery and J. A. Butts—"Micro-Fossiliferous Chart of an East Texas Oil Field."

J. W. Stovall—"Vertebrate Evidence of Jurassic in Cimarron County, Oklahoma."

M. B. Stephenson—"Shell Structure of the Genus Cytheridea."

Henry V. Howe—"Some Large Oysters of the Gulf Coast Tertiary."

Constance Leatherock—"Physical Characteristics of the Bartlesville and Barbank Sands in Northeastern Oklahoma and Southeastern Kansas."

Gayle Scott—"Ammonites of the Trinity Group (Cretaceous) in Texas, Louisiana and Arkansas."

F. B. Plummer—"A New Classification for Paleozoic Ammonoides."

Society of Petroleum Geophysicists

B. B. Weatherby—Presidential address.

D. C. Barton—"The Crosbyton Anomaly."

E. E. Blondeau—"Earth Temperature Measurement Over Two Known Structures."

A. B. Bryan—"Comparison of Seismograms Obtained With Seismographs of Radically Different Characteristics."

J. B. Eby—"Geophysical History of the Iowa Oil Field."

J. S. Macelwane—"Absolute and Relative Energy Relations in the Reflection and Refraction of Elastic Waves."

C. G. Morgan—"Geophysical Studies in Antarctics."

L. J. Neuman—"Torsion Balance Surveying on Inundated Areas."

C. E. Van Orstrand—(1) "Geothermal Methods of Estimating the Age of the Earth." (2) "Geothermal Gradients in the Oriskany Sand in New York, Pennsylvania and West Virginia."

E. E. Rosaire—"Growth of Company-Owned Operations in Geophysical Prospecting."

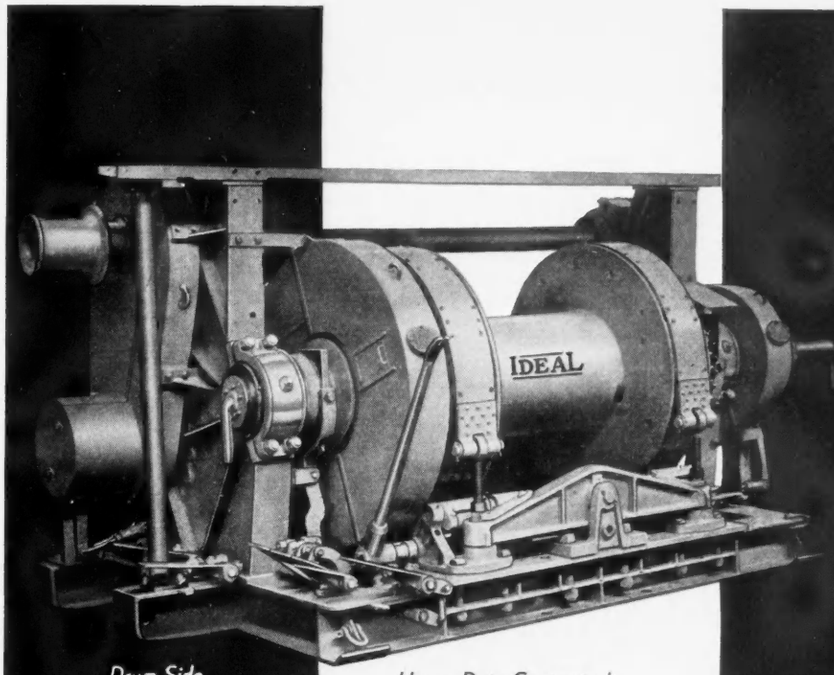
M. M. Slotnick—"On Seismic Computations."

Louis Statham—"Geophysical Prospecting by Observation of Electrical Transients."

R. R. Thompson—"A Seismic Electric Method of Prospecting."

J. H. Wilson—"A Program for the Exploration of the Great Plains."

A. H. Proctor (left), field superintendent for Magnolia Petroleum Company, formerly located at El Dorado, Kansas, has been made field superintendent for the same company in the Fitts Pool, Ada, Oklahoma, where the company has several rigs running. For several years before going to Kansas, he was superintendent for Magnolia Petroleum Company in the Mirando City area. With him in the picture are Tony Williams (center), field foreman, and Tom J. Litman, tool pusher, both with Magnolia Petroleum Company in the Fitts Pool.



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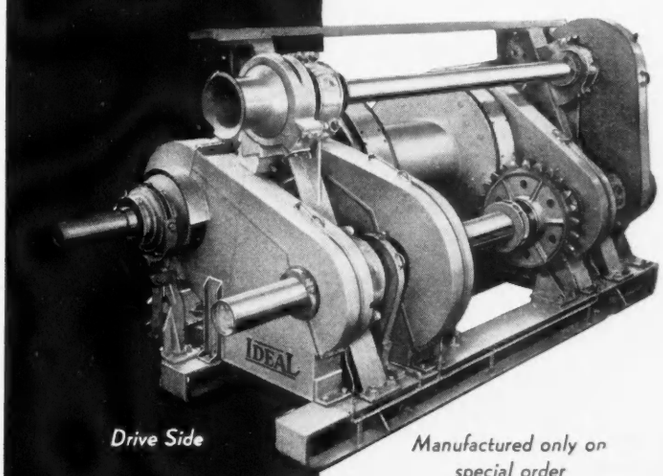

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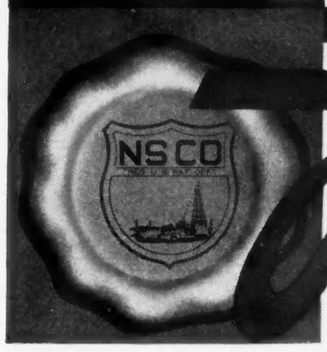

National

Motor Fuel Demand Up

PRODUCTION OF 2,772,600 BARRELS DAILY INDICATED CRUDE OIL DEMAND

FRED VAN COVERN

A review of the petroleum situation and a forecast of the demand for motor fuel and crude oil for the year 1936

By
FRED VAN COVERN
Director, Department of Statistics, American Petroleum Institute, New York, N. Y.

BEFORE
American Institute of Mining and Metallurgical Engineers, New York Meeting
FEBRUARY, 1936

I. The Demand for Motor Fuel

In estimating the domestic demand for motor fuel for 1936 particular attention was paid to the actual trend during 1935, especially the movement during the latter half. The turning point seems to have occurred in the second quarter. Calculations show that there was an increase in the actual shipments during the first quarter of 1935, compared with 1934, of only 0.58 percent. The second quarter shows an increase of 5.3 percent; the first half, an increase of 3.2 percent. From then on the figures indicate a rapid rate of increase. July was 9.6 percent plus; August, 9.5 percent plus; September up 8.9 percent; October, 9.8 percent increase, while November suffered in comparison with the previous year's abnormally high shipments, but, nevertheless registered about three percent. December's percentage increase was 10.1.

No one specific method of forecasting or formula was applied in arriving at the figure of 464,300,000 barrels domestic shipments. It is, rather, the average result of a number of different advances toward the problem. The intangibles involved in any one specific formula are of such magnitude and affect the final result so greatly that it seems very undesirable completely to rely upon any one formula.

In general, expected trends of business activity, current sales and probable future sales of automobiles, future registrations, the probable number to be scrapped, the average number in use over the period and the probable consumption per unit form the real basis of the estimate.

Some of the basic figures used were expected new car registrations during the year of 3,750,000 cars, trucks and busses and the scrapping of approximately 2,750,000 units.

One particular piece of information which we have found interesting during the past two years and which we have found a valuable adjunct in forecasting domestic demand, is a chart indicating by months, the shipments for the 12 months period ended that month. Considerable information as to trend can be derived from such a calculation charted monthly.

The forecast of the export demand for motor fuel during 1936 was not arrived at without considerable thought and recognition of the difficulties involved. The unusual conditions which affected the export market during the second half of 1935 will remain with us during part of 1936, at least. In addition to certain emergency requirements of some, there seems to have been a general filling up of storage everywhere, prompted, in some instances at least, by the stiffening of prices as much as to meet possible or actual national emergencies. The figure for 1936 is placed at 28,800,000 barrels or about 1,500,000 barrels less than were exported in 1935.

II. Crude Oil Runs to Stills

Required rates of runs to stills have been calculated through the use of a somewhat differently arrived at rate of yield of gasoline from crude oil. When the United States Bureau of Mines began the collection of unfinished gasoline inventories, it gave us the opportunity to refine our gasoline yield figure to some extent. Lack of information as to the movement of these inventories made it impossible to estimate what portion of the total production of finished gasoline, for any given month, came from the mere finishing of distillates derived from crude oil run to stills during earlier periods. In these months in which unfinished gasoline stocks increased without our knowing it, our old method of calculating yield from crude oil indicated a lower than actual yield because we did not know how much unfinished gasoline net was produced. In the months in which unfinished stocks were drawn upon, the old method gave us a higher than actual yield. The table of detailed calculations shows how this works and why. We will merely set out here a comparison of the yield percentages on the old and new bases for 1934 and 1935. The new method has, of course, been used in the 1936 calculations.

	1934		1935	
	Old Percent	New Percent	Old Percent	New Percent
January	43.49	43.25	43.74	44.17
February	43.13	43.69	43.29	44.15
March	42.79	42.51	43.48	43.40
April	43.77	42.80	43.65	44.04
May	43.16	42.75	44.33	44.47
June	42.86	42.66	44.16	44.26
July	43.38	43.06	45.28	44.82
August	44.09	43.22	44.83	44.59
September	43.58	42.77	44.25	44.18
October	43.63	43.29	44.92	44.58
November	43.53	43.62	44.23	44.62
December	43.40	43.47	43.95	44.30
Year	43.41	43.09	44.20	44.31

While the difference between the old and new method indicated above is only 0.32 percent for 1934 and 0.11 percent for 1935, individual monthly differences amount almost to one percent, and when one considers that in forecasting the probable demand for crude oil each one tenth of one percent more or less yield translated back into crude means nearly 10,000 barrels daily production more or less, it comes to mind that even a slight refinement in method here is ultimately worthwhile.

6.5 Percent in 1936

III. Gasoline Inventories

In calculating required crude oil runs to stills, total crude oil requirements and domestic production levels for the year, an estimate was made of the actual gasoline inventories as of January 31. We arrived at the conclusion that there were 63,300,000 barrels of finished and unfinished gasoline in storage as of that date, of which 6,800,000 barrels were unfinished. This compares with a total of 58,605,000 barrels of finished and unfinished as of January 31, 1935, indicating approximately 4,700,000 barrels more this year.

On the assumption that the industry does not want higher than economically desirable inventories at the opening of the high-consuming season, the first quarter's operations were calculated so as to force the March 31 level of inventories indicated.

We are of the opinion, however, that actual inventories at the end of the first quarter will be, for the country as a whole, considerably above 66,000,000 barrels unless the rate of production of gasoline is reduced between now and then.

If the 66,000,000 barrel mark is exceeded, the industry will, so to speak, have borrowed production to that extent from the second and third quarters, provided again however that it desires not to enter the following winter season with an inventory carry-over.

If runs to stills are continued at the January rate during February and March, an inventory level of 71,000,000 barrels or more is not at all unlikely. In defense of the large additions to storage during recent weeks, especially, one must admit that it has been difficult to move gasoline to many unreported secondary supply points because of the prevailing weather conditions. When waterways open up and it becomes easier to transport supplies to these points shipments may show increased activity and in that way tend to reduce inventories at primary terminals and other reporting points.

The industry seems already to have worked itself into a position of disadvantage in unfinished gasoline which will grow worse before the end of the first quarter.

IV. Requirements of Domestic Crude Oil

Requirements of domestic crude oil are, of course, composed of the amounts necessary as runs to stills, the amounts used directly as such and losses and the transfers of crude oil to fuel oil. Against this total is applied an estimated amount of crude oil to be imported. It comes to mind, in this connection, however, that efforts are being made to limit the importation of crude oil and products in direct relation to the domestic demand therefor. If such legislation is ultimately adopted and if the calculations based upon any fixed quota system differ in respect to crude oil imports from those indicated in the table

(a) Motor Fuel Demand

The forecast of the domestic demand for motor fuel during 1936 indicates a probable shipment of 464,300,000 barrels. On a daily average basis this is 6.5 percent above preliminary figures of 1935, which show that 434,873,000 barrels were shipped to the trade during that year.

After smoothing the curve of 1935 daily average domestic shipments for each month, the quarterly changes during the year show for the first three months period an increase of 10.7 percent; the second quarter, 6.4 percent plus; the third quarter, 5.0 percent increase and the fourth quarter 5.1 percent increase over 1935.

A continuation of the unusual weather conditions now prevailing will, of course, have some effect upon demand and should be kept in mind when considering the figures of the first quarter.

Export demand is calculated at 28,800,000 barrels, a decrease of approximately 1,500,000 barrels below 1935 export shipments.

The total demand forecast for the year, or 493,100,000 barrels, compares with 465,253,000 barrels total shipments for 1935, or an increase of 5.7 percent, considering the extra day in 1936.

(b) Crude Oil Runs to Stills

Required runs to stills for the year are estimated at 2,740,000 barrels per day. This compares with the 2,647,200 barrels daily actually run to stills during 1935, and is calculated on a basis of 44.5 percent yield of gasoline from crude oil. Runs to stills reach a maximum of 2,880,000 barrels daily in August, while yields are indicated as almost constantly increasing until a maximum of 45 percent is reached in December. Daily average runs to stills by quarters follow: First, 2,620,000 barrels; Second, 2,790,000 barrels; Third 2,840,000 barrels, and the Fourth, 2,710,000 barrels daily.

(c) Gasoline Inventories

The above indicated rates of runs to stills were predicated upon two assumptions: (1) That the industry is unanimous in recognizing the desirability of arriving at the beginning of the high-consuming season in a not over-stocked position, and (2) That it is equally desirous of entering the 1936-1937 winter season without surplus inventories.

Economically desirable levels of inventories of finished and unfinished gasoline for the industry as a whole are placed at 66,000,000 barrels as of March 31, and 50,000,000 barrels as of September 30.

(d) Requirements of Domestic Crude Oil

The total demand for domestic crude oil is estimated at 2,880,000 barrels daily for the year.. By quarters the figures are: First, 2,760,000; Second, 2,940,000; Third, 3,000,000 and Fourth, 2,830,000 barrels daily. These are total requirements after allowing for all domestic uses and exported amounts, and also imports of crude, but before any withdrawals from storage.

(e) Crude Oil Inventories

Neither additions to nor withdrawals from crude storage are indicated in the forecast for February and March. There seems actually to have been withdrawn during January about 1,600,000 barrels. Total withdrawals for the year are placed at 18,300,000 barrels, or 50,000 barrels per day, most of which is spread over the period from April 1 to November 30. December indicates neither withdrawals nor additions.

(f) Domestic Crude Oil Production

Applying the indicated stock changes to calculated total requirements of domestic crude oil, we arrive at the necessary new crude oil production. The daily average for the year is 2,830,000 barrels, compared with actual production of 2,722,600 barrels during 1935.

By quarters the calculation indicates the following levels: First Quarter, 2,740,000 barrels; Second Quarter, 2,870,000 barrels; Third Quarter, 2,900,000 barrels, and the Fourth Quarter, 2,820,000 barrels daily.

attached, the required domestic crude oil production will be affected accordingly. It is entirely possible also, that the degree of severity of import restrictions will affect export activity due to possible switching of present sources of supply of some markets, in that way affecting the calculation of the export items indicated.

V. Crude Oil Inventories

On October 31, 1929, crude oil inventories amounted to 433,500,000 barrels, the all-time peak of crude oil in storage. Declines were indicated in subsequent years but again increases were registered until on August 31, 1933, they had reached a level of 359,945,000 barrels. Since that date there has been, with slight variations, almost continuous improvement in these figures until on December 31, 1935, there were 314,631,000 barrels in storage, the lowest level since the latter part of 1926.

While only a slight change in these inventories is shown during the first quarter, the desirability of further liquidation over the longer term must

Motor Fuel and Crude Oil Supply and Demand — 1936 — January Actuals Estimated

(Figures in thousands of barrels)

	*Jan.	Feb.	Mar.	1st. Quarter 1936	April	May	June	2nd Quarter 1936	July	Aug.	Sept.	3rd Quarter 1936	Oct.	Nov.	Dec.	4th. Quarter 1936	Total Year 1936
Demand:																	
Domestic	31,400	30,500	35,500	97,400	37,500	41,200	41,700	120,400	44,500	45,300	41,700	131,500	41,200	37,500	36,300	115,000	464,300
Export	3,100	2,700	2,700	8,500	2,500	2,500	2,200	7,200	2,200	2,200	2,150	6,550	2,200	2,150	2,200	6,550	28,800
Total	34,500	33,200	38,200	105,900	40,000	43,700	43,900	127,600	46,700	47,500	43,850	138,050	43,400	39,650	38,500	121,550	493,100
Supply:																	
Imports																	
Benzol	170	160	180	510	170	170	170	510	175	175	175	525	180	175	180	535	2,080
Natural Gaso. Supplied Direct	700	650	750	2,100	730	760	730	2,220	810	810	780	2,400	590	600	610	1,800	8,520
Total Supply other than Ref. M.F.	870	810	930	2,610	900	930	900	2,730	985	985	955	2,925	770	775	790	2,335	10,600
Supply Ref. M. F.	33,630	32,390	37,270	103,290	39,100	42,770	43,000	124,870	45,715	46,515	42,895	135,125	42,630	38,875	37,710	119,215	482,500
Change in Fin. Stocks only	+5,853	+1,680	+1,820	+9,353	—425	—1,830	—2,820	—5,075	—3,625	—3,625	—2,675	—9,925	—750	+1,000	+2,450	+2,700	—2,947
Prod. Fin. at Ref.	39,483	34,070	39,090	112,643	38,675	40,940	40,180	119,795	42,090	42,890	40,220	125,200	41,880	39,875	40,160	121,915	479,553
Percent Nat. Blended	6.6	6.4	6.0	6.4	5.8	5.6	5.7	5.7	5.8	6.5	7.2	6.5	8.5	9.0	8.0	8.5	6.8
Amt. Nat. Blended	2,606	2,280	2,350	7,236	2,240	2,290	2,290	6,820	2,440	2,790	2,900	8,130	3,560	3,590	3,210	10,360	32,546
Prod. Fin. Str.-run and Cracked	36,877	31,790	36,740	105,407	36,435	38,650	37,890	112,975	39,650	40,100	37,320	117,070	38,320	36,285	36,950	111,555	447,007
Change in Unfin. Stocks only	+754	—385	—415	—46	—50	—150	—150	—350	—250	—250	—150	—650		+150	+150	+300	—746
Prod. (Fin. and Unfin. from Crude)	37,631	31,405	36,325	105,361	36,385	38,500	37,740	112,625	39,400	39,850	37,170	116,420	38,320	36,435	37,100	111,855	446,261
Percent from Crude	43.9	44.4	44.3	44.2	44.2	44.3	44.4	44.3	44.5	44.6	44.7	44.6	44.8	44.9	45.0	44.9	44.5
Total Prod. Gaso. from Crude and Amount Blended	40,237	33,685	38,675	112,597	38,625	40,790	40,030	119,445	41,840	42,640	40,070	124,550	41,880	40,025	40,310	122,215	478,807
Stocks:																	
Finished Gasoline	†50,647																
	56,500	58,180	60,000		59,575	58,245	55,425		51,350	47,675	45,000		44,250	44,500	47,700		—2,947
Unfinished Gasoline	†6,046																
	6,800	6,415	6,000		5,950	5,800	5,650		5,400	5,150	5,000		5,000	5,150	5,300		—746
Total Fin. and Unfin.	†56,693																
	63,300	64,595	66,000		65,525	64,045	61,075		56,750	52,825	50,000		49,250	49,650	53,000		—3,693
Crude Oil:																	
Runs to Stills, Total	85,750	70,730	82,000	238,480	82,320	86,910	85,000	254,230	88,540	89,350	83,150	261,040	85,540	81,150	82,440	249,130	1,002,880
Daily Average	2,770	2,440	2,650	2,620	2,740	2,800	2,830	2,790	2,860	2,880	2,770	2,840	2,760	2,710	2,660	2,710	2,740
Exports	4,000	3,500	4,000	11,500	3,500	4,500	5,500	13,500	5,500	5,000	4,500	15,000	4,000	3,500	4,000	11,500	51,500
As Such and Tr. to Fuel in California	2,750	2,550	2,750	8,050	2,650	2,750	2,650	8,050	2,750	2,750	2,650	8,150	2,750	2,650	2,750	8,150	32,400
Total Demand Crude	92,500	76,780	88,750	258,030	88,470	94,160	93,150	275,780	96,790	97,100	90,300	284,190	92,290	87,300	89,190	268,780	1,086,780
Imports of Crude Oil	2,000	2,400	2,700	7,100	2,800	3,000	2,700	8,500	3,000	3,000	2,500	8,500	2,700	2,600	2,700	8,000	32,100
Requirements Domestic Crude, Total	90,500	74,380	86,050	250,930	85,670	91,160	90,450	267,280	93,790	94,100	87,800	275,690	89,590	84,700	86,490	260,780	1,054,680
Daily Average	2,920	2,560	2,780	2,760	2,860	2,940	3,015	2,940	3,030	3,040	2,930	3,000	2,890	2,820	2,790	2,830	2,880
Stocks of Crude Oil	†314,631																
	313,031	313,031	313,031		311,981	309,981	306,981		303,231	299,531	298,031		296,781	296,331	296,331		296,331
Change in Stocks of Crude	—1,600			—1,600	—1,050	—2,000	—3,000	—6,050	—3,550	—3,900	—1,500	—8,950	—1,250	—450		—1,700	—18,300
Domestic Prod. of Crude Oil, Total	88,900	74,380	86,050	249,330	84,620	89,160	87,450	261,230	90,240	90,200	86,300	266,740	88,340	84,250	86,490	259,080	1,036,380
Daily Average	2,870	2,570	2,780	2,740	2,820	2,880	2,910	2,870	2,910	2,910	2,880	2,900	2,850	2,810	2,790	2,820	2,830

*Estimated actual.
†As of December 31, 1935.

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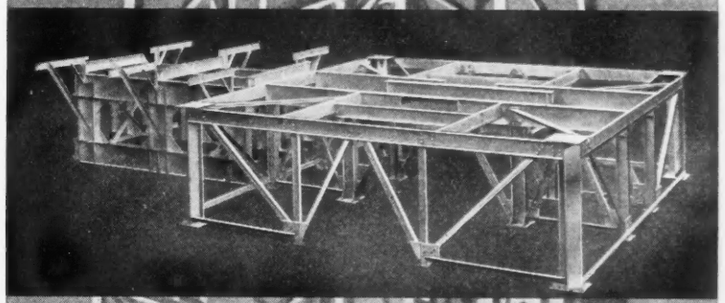

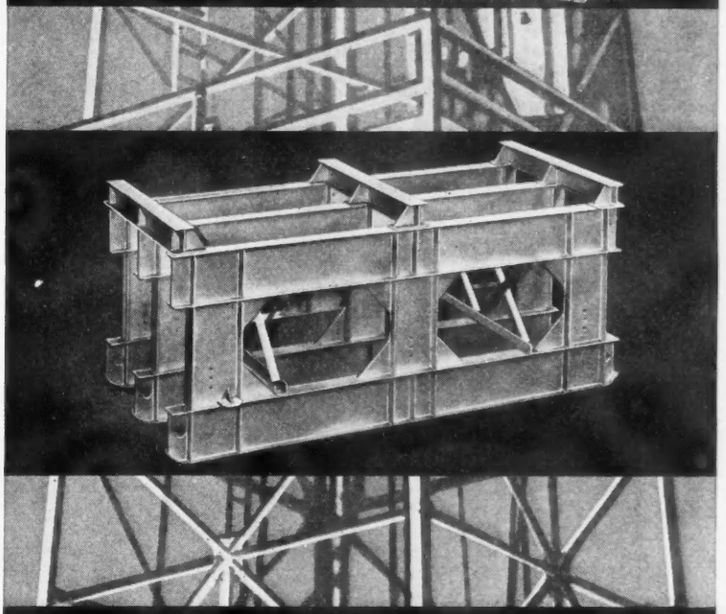

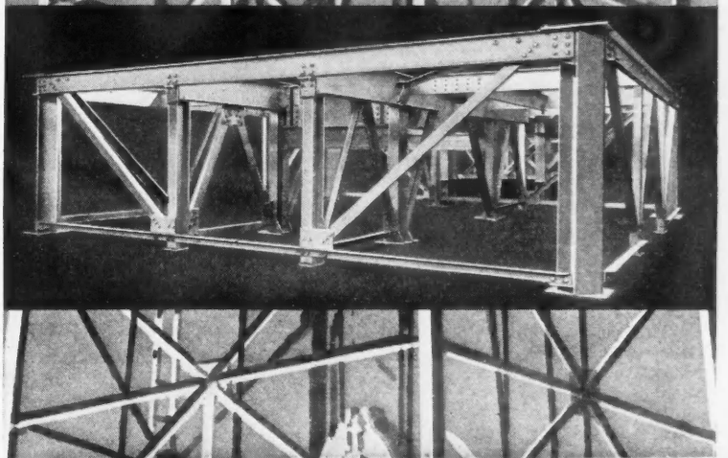

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26'	71'3"	1,000,000		7,200
30'	71'3"	1,000,000		8,000
ROTARY SUPPORTS (INTERIOR POSTS AND SILLS ONLY)				
		CASING LBS.	DRILL PIPE LBS.	
24'		300,000	250,000	9,300
26'		300,000	250,000	10,430
26'		500,000	250,000	11,300
30'		500,000	250,000	12,800
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be recognized. Press despatches carry the information that the United States Bureau of Mines considers the industry's 1940 requirements of crude oil in storage above ground to be about 200,000,000 barrels. While no detailed studies of these requirements have ever been completed, the writer, nevertheless, is of the opinion that the figure has been placed at too low a level and that 250,000,000 barrels more nearly represents the minimum requirements of today, in order that the industry may conveniently and economically conduct its business, and, it seems reasonable to say that if that amount is necessary now, the requirements of 1940 may reasonably be expected to be higher.

The following figures indicate by fields of origin the more recent trend of these inventories showing that in particular grades, notably East Texas, considerable liquidation has taken place.

It seems highly desirable that a complete study of these above-ground requirements of crude be made. Until such studies are complete no proper course of liquidation of any existing surplus can be charted. It is felt, however, that 50,000 barrels per day, or a total liquidation of 18,300,000 barrels during 1936, would be neither impossible nor unreasonable. During 1934 the draught amounted to 16,969,000 barrels while in 1935 about 22,600,000 barrels were withdrawn.

VI. Domestic Crude Oil Production

Applying the above indicated 18,300,000 barrel draught on stocks, and attempting to smooth the curve as much as possible, we find the following indicated daily average crude oil production required:

	Barrels
*January	2,870,000
February	2,570,000
March	2,780,000
1st. Quarter	2,740,000
April	2,820,000
May	2,880,000
June	2,910,000
2nd. Quarter	2,870,000
July	2,910,000
August	2,910,000
September	2,880,000
3rd. Quarter	2,900,000
October	2,850,000
November	2,810,000
December	2,790,000
4th. Quarter	2,820,000
Year	2,830,000
1935 Actual	2,722,600

*Estimated actual.

VII. Gas and Fuel Oil

How much of the present condition of gasoline inventories is directly traceable to the relatively low levels of distillate and residual fuel stocks and the consequent desire of the industry to increase the production of those products—through increased runs to stills—is, of course, impossible to say but there may be a very direct connection.

Following is a comparison as of December 31, 1935, of the latest Bureau of Mines figures available:

Gas and Fuel Oil Inventories, December 31, 1935 vs. December 31, 1934

	Gas Oil and Distillate Fuel Oils	Residual Fuel Oil	Total
East of California 1934	16,641,000	26,579,000	43,220,000
East of California 1935	12,955,000	22,827,000	35,782,000
California 1934	5,316,000	61,861,000	67,177,000
California 1935	6,975,000	61,227,000	68,202,000
Total United States 1934	21,957,000	88,440,000	110,397,000
Total United States 1935	19,930,000	84,054,000	103,984,000

Stocks of Crude Petroleum by Fields of Origin

(Barrels of 42 Gallons)

GRADE	September 30, 1933	December 31, 1933	December 31, 1934	December 31, 1935
Pennsylvania Grade	5,714,000	5,581,000	4,864,000	4,599,000
Other Appalachian (including Kentucky)	1,177,000	1,431,000	1,178,000	897,000
Lima-N.E. Indiana-Michigan	1,364,000	1,769,000	1,284,000	1,295,000
Illinois-S.W. Indiana	10,863,000	11,181,000	11,455,000	10,968,000
North Louisiana and Arkansas	12,116,000	11,874,000	9,981,000	9,676,000
West Texas and S.E. New Mexico	33,285,000	32,780,000	29,838,000	29,509,000
East Texas	49,902,000	46,171,000	31,166,000	21,589,000
Oklahoma, Kansas, N. Texas, etc.	152,944,000	154,641,000	152,517,000	132,884,000
Gulf Coast	17,707,000	16,044,000	18,688,000	26,368,000
Rocky Mountain	27,545,000	27,543,000	28,048,000	27,251,000
California	35,076,000	35,111,000	35,914,000	35,545,000
Foreign	3,186,000	3,055,000	3,791,000	3,745,000
Lease (producers') Stocks	9,025,000	8,131,000	8,530,000	10,305,000
Total all Stocks	359,904,000	355,312,000	337,254,000	314,631,000

Indicated below is a comparison of the residual fuel oil inventories east of California:

Residual Fuel Oil—East of California

	December 31, 1935	December 31, 1934
East Coast	4,282,000	7,222,000
Louisiana Gulf Coast	2,592,000	3,150,000
Texas Gulf Coast	7,537,000	7,461,000
Total Coastal Areas	14,411,000	17,833,000
Appalachian	278,000	712,000
Indiana-Illinois	2,128,000	3,008,000
Oklahoma-Kansas-Mo.	3,270,000	2,244,000
Inland Texas	1,807,000	1,554,000
North Louisiana-Arkansas	455,000	765,000
Rocky Mountain	478,000	463,000
Total all Interior Areas	8,416,000	8,746,000
Total East of California	22,827,000	26,579,000

[*Continued on page 29*]

District Stocks of Finished and Unfinished Gasoline

	Week Ended Feb. 8, 1936	Week Ended Feb. 1, 1936	Week Ended Jan. 25, 1936	Actual B. of M. Jan. 31, 1935	Actual B. of M. Feb. 28, 1935	Actual B. of M. Mar. 31, 1935
Finished Gasoline:						
East Coast	14,799,000	14,858,000	13,724,000	15,203,000	17,563,000	18,486,000
Appalachian	2,728,000	2,643,000	2,569,000	2,181,000	2,321,000	2,194,000
Indiana, Illinois, Kentucky	9,748,000	9,412,000	9,092,000	8,176,000	9,574,000	10,163,000
Oklahoma, Kansas, Missouri	6,440,000	6,349,000	6,040,000	5,754,000	6,147,000	6,303,000
Inland Texas	1,941,000	1,843,000	1,822,000	1,748,000	1,904,000	1,877,000
Texas Gulf Coast	7,596,000	6,855,000	6,526,000	6,938,000	7,772,000	7,294,000
Louisiana Gulf Coast	1,393,000	1,337,000	1,239,000	1,332,000	1,446,000	1,697,000
North Louisiana & Arkansas	397,000	397,000	427,000	258,000	301,000	270,000
Rocky Mountain	1,211,000	1,158,000	1,135,000	846,000	985,000	1,126,000
California	11,772,000	11,688,000	11,503,000	10,830,000	10,926,000	10,995,000
Total United States	58,005,000	56,540,000	54,077,000	53,266,000	58,939,000	60,405,000
Unfinished Gasoline:						
East Coast	1,021,000	1,030,000	981,000	856,000	990,000	917,000
Appalachian	339,000	333,000	314,000	293,000	343,000	403,000
Indiana, Illinois, Kentucky	806,000	786,000	772,000	700,000	716,000	752,000
Oklahoma, Kansas, Missouri	675,000	643,000	670,000	650,000	823,000	692,000
Inland Texas	294,000	265,000	249,000	206,000	232,000	228,000
Texas Gulf Coast	1,801,000	1,955,000	1,966,000	1,387,000	1,476,000	1,647,000
Louisiana Gulf Coast	170,000	192,000	150,000	195,000	232,000	199,000
North Louisiana & Arkansas	52,000	57,000	42,000	52,000	43,000	36,000
Rocky Mountain	87,000	85,000	88,000	108,000	114,000	106,000
California	1,488,000	1,474,000	1,438,000	892,000	980,000	905,000
Total United States	6,733,000	6,820,000	6,670,000	5,339,000	5,949,000	5,885,000
Finished and Unfinished Gasoline						
East Coast	15,800,000	15,888,000	14,705,000	16,059,000	18,553,000	19,403,000
Appalachian	3,067,000	2,976,000	2,883,000	2,474,000	2,664,000	2,597,000
Indiana, Illinois, Kentucky	10,554,000	10,198,000	9,864,000	8,876,000	10,290,000	10,915,000
Oklahoma, Kansas, Missouri	7,115,000	6,992,000	6,710,000	6,404,000	6,970,000	6,995,000
Inland Texas	2,235,000	2,108,000	2,071,000	1,954,000	2,136,000	2,105,000
Texas Gulf Coast	9,397,000	8,810,000	8,492,000	8,325,000	9,248,000	8,941,000
Louisiana Gulf Coast	1,563,000	1,529,000	1,389,000	1,527,000	1,678,000	1,896,000
North Louisiana & Arkansas	449,000	454,000	469,000	310,000	344,000	306,000
Rocky Mountain	1,298,000	1,243,000	1,223,000	954,000	1,099,000	1,232,000
California	13,260,000	13,162,000	12,941,000	11,722,000	11,906,000	11,900,000
Total United States	64,738,000	63,360,000	60,747,000	58,605,000	64,888,000	66,290,000

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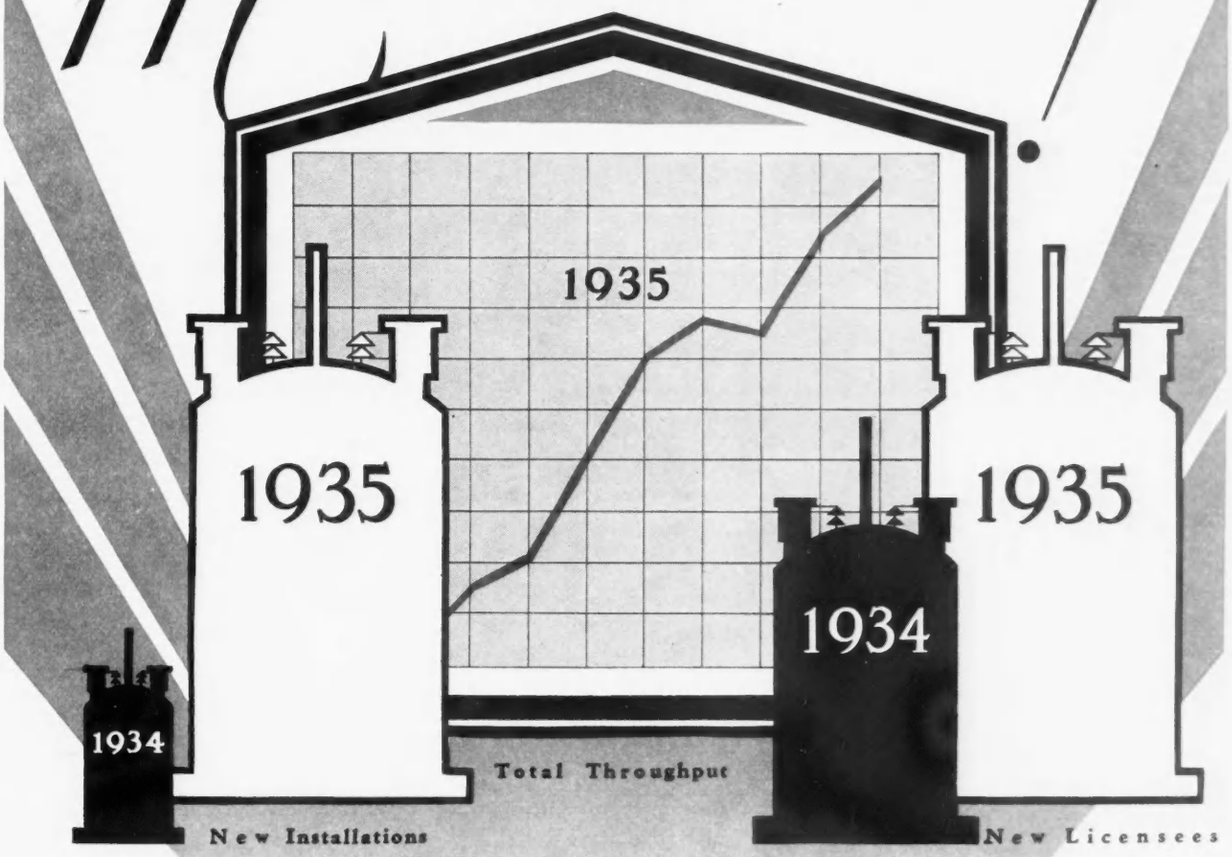

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Darby Petroleum Company
Empire Gas & Fuel Company
Fohs Oil Company
General Crude Oil Company
Gulf Oil Corporation
Harrison & Abercrombie Oil Company
Houston Oil Company of Texas
Humble Oil & Refining Company
Kirby Petroleum Company
Magnolia Petroleum Company
Marathon Oil Company
Mid-Continent Petroleum Corporation
Navarro Oil Company
Pan American Production Company
Phillips Petroleum Company
Pure Oil Company
Quintana Petroleum Company
Republic Production Company
Rio Bravo Oil Company
Rycade Oil Corporation
Shell Petroleum Corporation
Showers and Moncrief
Sinclair-Prairie Oil Company
Skelly Oil Company
Standard Oil Company (Kansas)
Stanolind Oil and Gas Company
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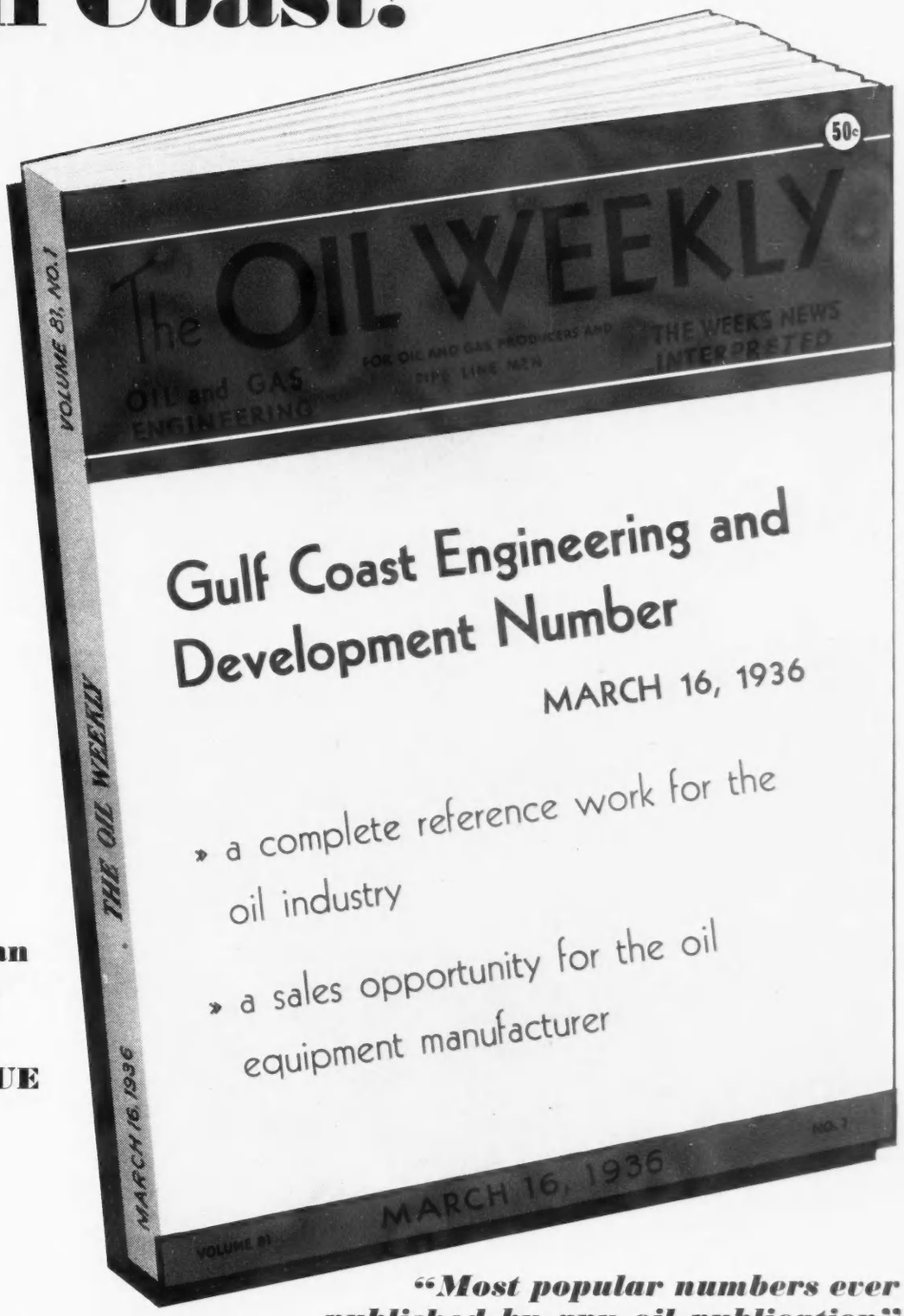
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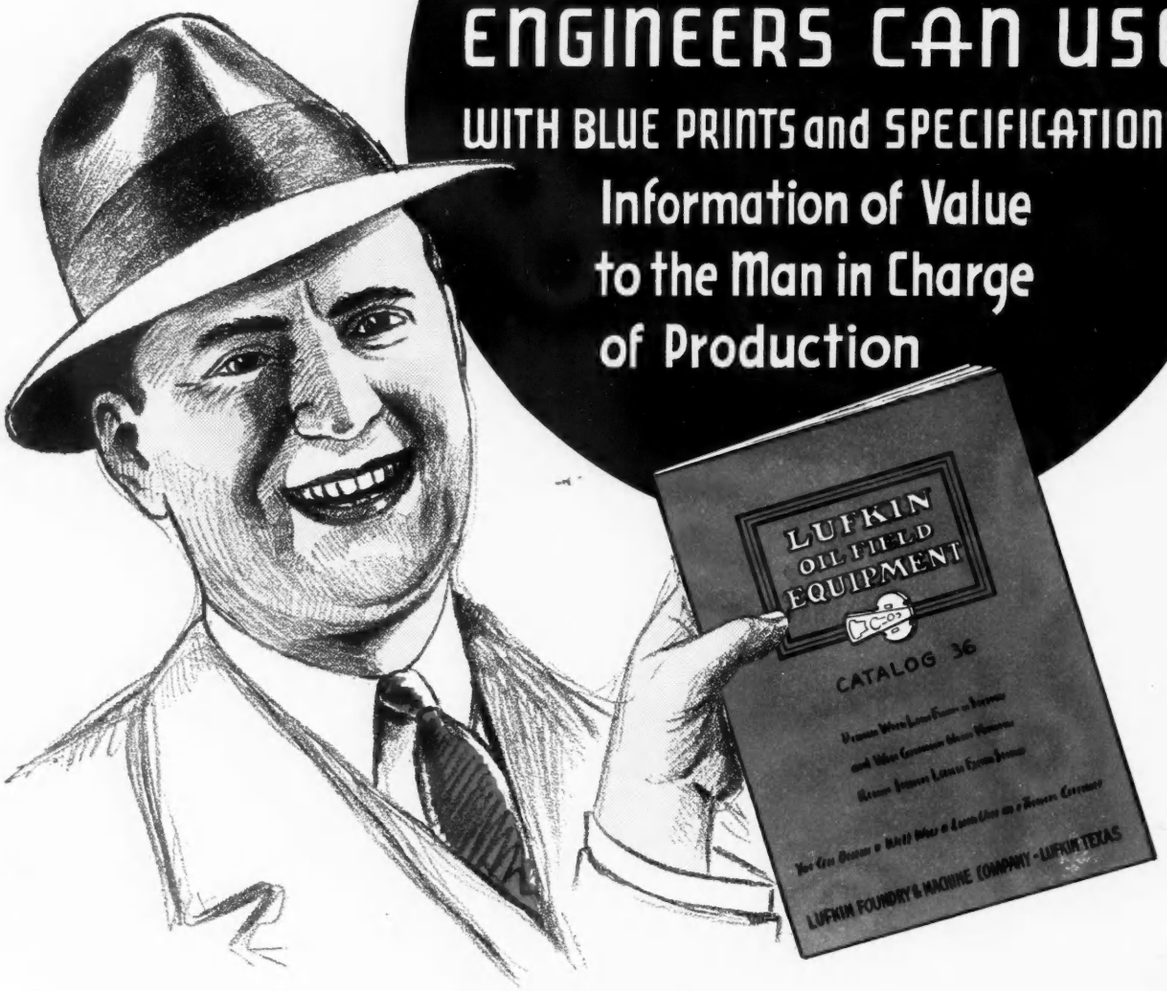

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[*Continued from page 24*]

The prevailing weather conditions have also contributed to the distillate fuel situation. On December 31 these inventories were as follows:

Gas Oil and Distillate Fuel Oil—East of California

	December 31, 1935	December 31, 1934
East Coast	4,181,000	5,358,000
Louisiana Gulf Coast	1,617,000	2,363,000
Texas Gulf Coast	3,638,000	4,104,000
Total Coastal Areas	9,436,000	11,825,000
Appalachian	204,000	358,000
Indiana-Illinois	1,716,000	2,770,000
Oklahoma-Kansas-Mo.	989,000	1,126,000
Inland Texas	345,000	255,000
North Louisiana-Arkansas	101,000	114,000
Rocky Mountain	164,000	193,000
Total all Interior Areas	3,519,000	4,816,000
Total East of California	12,955,000	16,641,000

Figures by districts for January are not yet available but it would appear that the over-all picture for the end of that month is about as follows:

Gas and Fuel Oil Inventories, January 31, 1936 (est'd) vs. January 31, 1935

	Gas Oil and Distillate Fuel Oils	Residual Fuel Oil	Total
East of California 1935	12,782,000	25,274,000	38,056,000
East of California 1936	10,000,000	21,000,000	31,000,000
California 1935	5,239,000	60,879,000	66,118,000
California 1936	6,000,000	63,000,000	69,000,000
Total United States 1935	18,021,000	86,153,000	104,174,000
Total United States 1936	16,000,000	84,000,000	100,000,000

VIII. General

No paper of this sort would be complete without some mention of the possible effect upon the gasoline production statistics of the advances being made in refining equipment.

We have called attention to, and we are continuing to remark about the high rate of cracked gasoline production.

Is cracked gasoline production really increasing as rapidly as the figures seem to indicate or is some of this increase due to the possible inclusion of reformed gasoline, gasoline made from refinery gases, and the gasoline produced as a result of operation of continuous distillation units?

Straight-run gasoline production yields appear to be constantly decreasing. Is straight-run production really decreasing as rapidly as yields indicate, or, is it because more and more cannot be separated out of the total actual production of gasoline and is therefore reported with cracked production?

How will the reporting of the production of polymer gasoline be handled?

The time may soon, if it has not already arrived, when we should ask the refining industry for

(a) The production of gasoline from crude oil;
(b) The amount of natural gasoline, blended, and
(c) The amount of polymer gasoline produced and amount blended.

Motor Fuel and Crude Oil Supply and Demand

(Barrels of 42 gallons)

	Year 1934	Preliminary 1935	Estimated 1936
Demand			
(1) Domestic	410,339,000	434,873,000	464,300,000
(2) Export	24,686,000	30,380,000	28,800,000
(3) Total	435,025,000	465,253,000	493,100,000
Supply			
(4) Imports	1,000	20,000	.....
(5) Benzol	1,708,000	1,877,000	2,080,000
(6) Natural Gasoline Supplied Direct	8,334,000	8,780,000	8,520,000
(7) Total Supply of other than Refinery Motor Fuel	10,043,000	10,677,000	10,600,000
(8) Supply of Refinery Motor Fuel	424,982,000	454,576,000	482,500,000
(9) Change in Finished Stocks only	−8,050,000	+3,116,000	−2,947,000
(10) Production of Finished at Refineries	416,932,000	457,692,000	479,553,000
(11) Percent of Natural Gasoline Blended	6.7	6.7	6.8
(12) Amount of Natural Gasoline Blended	28,162,000	30,572,000	32,546,000
(13) Production of Finished Straight-run and Cracked	388,770,000	427,120,000	447,007,000
(14) Change in Unfinished Stocks only	−2,873,000	+1,032,000	− 746,000
(15) Production (Finished and Unfinished) from Crude Oil	385,897,000	428,152,000	446,261,000
(16) Percent Yield	43.09	44.31	44.5
(17) Total Production of Gasoline from Crude and Amount Blended	414,059,000	458,724,000	478,807,000
Stocks			
(18) Finished Gasoline	47,531,000	50,647,000	47,700,000
(19) Unfinished Gasoline	5,014,000	6,046,000	5,300,000
(20) Total Finished and Unfinished Gasoline	52,545,000	56,693,000	53,000,000
Crude Oil			
(21) Runs to Stills—Total	895,636,000	966,243,000	1,002,880,000
Daily Average	(2,454,000)	(2,647,200)	(2,740,000)
(22) Exports	41,127,000	51,378,000	51,500,000
(23) As such and Transfers to Fuel in California	23,829,000	31,003,000	32,400,000
(24) Total Demand for Crude Oil	960,592,000	1,048,624,000	1,086,780,000
(25) Imports of Crude Oil	35,558,000	32,239,000	32,100,000
(26) Requirements of Domestic Crude Oil—Total	925,034,000	1,016,385,000	1,054,680,000
Daily Average	(2,534,000)	(2,784,600)	(2,880,000)
(27) Stocks of Crude Oil	337,254,000	314,631,000	296,331,000
(28) Change in Crude Oil Stocks	−16,969,000	−22,623,000	−18,300,000
(29) Domestic Production of Crude Oil—Total	908,065,000	993,762,000	1,036,380,000
Daily Average	(2,488,000)	(2,722,600)	(2,830,000)

A.P.I. THREAD-FITTINGS

Dallas. — Announcement has been made by the American Petroleum Institute's Division of Production of the publication of A.P.I. Standards, No. 5-F, First Edition, January, 1936, "A.P.I. Specifications for Threads in Fittings (Tentative)." The specifications, prepared by the Special Sub-committee on Standardization of Valves and Fittings, covers thread dimensions, gages, and gaging practice for threaded fittings intended for use with A.P.I. tubular material.

New York.—"Petroleum Drilling and Production" has been published by the American Petroleum Institute as a chart showing details of commonly used methods of drilling for and producing crude oil. The chart, which is 17 by 22 inches, is a companion to the "Petroleum Flow Chart" published two years ago as a simplified explanation of complicated refining processes.

The new chart shows cable tool and rotary drilling rigs in detail, with essential parts named, cross sections of typical formations in which oil is found, and methods of production and equipment used both in flowing and pumping wells.

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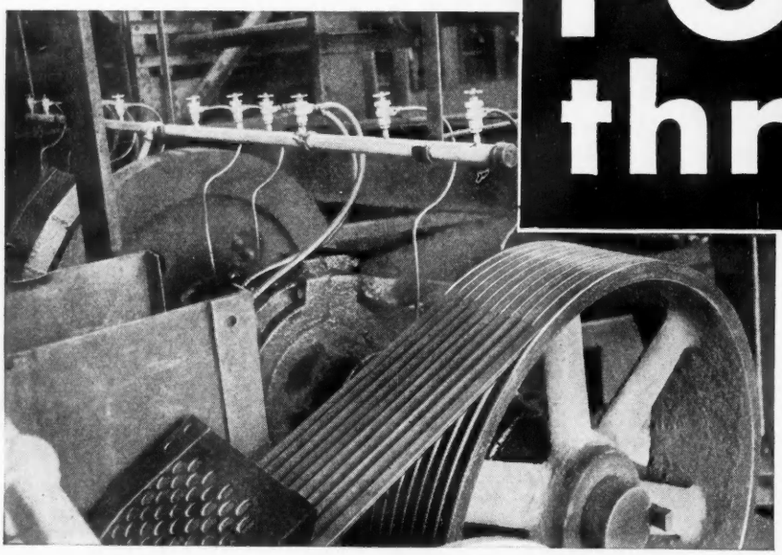

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Flow of Oil-Gas Mixtures In the Tubing of a Well

By B. H. SAGE and W. N. LACEY
California Institute of Technology,
Pasadena, California.

ABSTRACT

THERMODYNAMIC diagrams are presented for several mixtures of the oil and gas produced from a flowing well in Dominguez field.

Methods used in evaluating energy quantities involved in the flowing process are discussed in some detail.

For flow at the rate of 120 barrels per day from well bottom to surface in the well from which the samples were taken, the heat lost to the surroundings aggregated 32.5 B.t.u. per pound of flowing mixture, the energy involved in frictional effects was 2.4 B.t.u., while the energy required for elevating the material was 7.2 B.t.u. per pound. The specific volume of the mixture and its average velocity are given as functions of the depth below the surface.

This is one of a group of three papers, a part of the report of the American Petroleum Institute's Advisory Committee on Fundamental Research on Occurrence and Recovery of Petroleum, and is reprinted from the Institute's Production Bulletin No. 216, Los Angeles Meeting, November, 1935, which has just now been released for general publication. The other papers: "Viscosity of Hydrocarbon Solutions. Solutions of Ethane and *n*Butane in Crystal Oil," and "Viscosity of Hydrocarbon Solutions. Solutions of Four Hydrocarbon Gases in a Crude Oil," will be published in subsequent issues.

THE evaluation of the energy relations in the flow of two-phase mixtures in pipes or tubes offers a difficult problem. Such an evaluation by the usual hydrodynamic methods requires quantitative information regarding the density and effective viscosity of the mixture as a whole, the velocity and nature of flow including slippage effects, and the surface condition of the conduit before a friction factor can be estimated. Friction factors are of somewhat uncertain precision in the case of single-phase flow, but their determination for two-phase flow is greatly complicated by phase changes occurring during the process, especially when it is accompanied by considerable changes in temperature and pressure. Such conditions of flow are commonly met in the tubing of producing oil wells, and the ability to determine the energy relations for such cases assumes practical importance.

An alternate method of attack is offered by the application of thermodynamics. In the case of a flow process which has reached a steady state with respect to time, the usual application of an energy balance can be made without difficulty. If the thermodynamic properties of the mixture flowing are known, the only additional information required consists of a knowledge of the changes in pressure, temperature, and elevation during progress of the fluid through the conduit, together with the inside dimensions of the latter and the rate of flow.

The authors have presented elsewhere[2] a discussion of the application of this method to the case of a well in which the flowing material entered the bottom of the tubing entirely as liquid, thus favoring the procurement of representative depth samples of the material. It was shown that samples of the oil and gas as separated at the well head traps yielded, when blended in the proper proportions, a material showing satisfactory agreement in its properties with those of the corresponding depth samples. The difficulty of obtaining representative depth samples, in the more common case where free gas accompanies the liquid at all points in the tubing, is greatly increased. It would seem, therefore, that carefully-taken surface samples could be considered to be more reliable than depth samples, if accurate rates of production of the different materials are determined. Such surface samples were used as the basis for the present paper.

Samples and Their Properties

The samples were obtained from Dominguez field in the Los Angeles Basin in California through the courtesy of Union Oil Company. The well from which they were procured was producing from the fifth Callender zone. The details of sampling at the surface traps, of blending the gas samples to give a composite well-production gas sample, have been described elsewhere[1 3] by the authors. Studies of the thermodynamic properties of mixtures of the oil and gas were made and reported in tabular form.[3]

A more useful form of presentation of the data for analysis of the energy relations in flowing processes is found in the temperature-entropy diagram. Unfortunately, however, this diagram for such mixtures as are here considered yields only a narrow band passing diagonally across a large field. This is due to the fact that the isothermal changes of entropy with changes in pressure are small compared to the changes of entropy with temperature. This situation is illustrated in Figure 1, which contains three lines of constant pressure for the temperature range studied, from 60°F. to 220°F. These lines for widely-different pressures lie closely enough together that the addition of lines of constant volume and of constant heat content would cause confusion and render interpolation almost impossible.

In order to spread this band to usable proportions without having to enlarge the temperature scale to unwieldy dimensions, a device has been utilized. This con-

sists of plotting a special function of entropy [viz., S — 0.0008 (t — 60) in which S in the entropy in B.t.u. per pound per °F., and t is the temperature in °F.] instead of entropy itself. This serves to plot differences from a base line which is almost parallel, on the temperature-entropy diagram in Figure 1, to the constant pressure

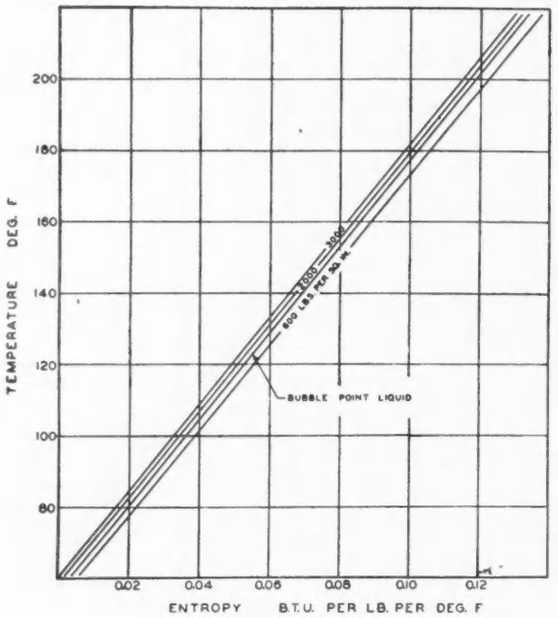

FIGURE 1
Temperature-Entropy Chart for a Mixture of Gas and Oil Containing 3.253 Mass Percent of Gas.

lines shown. The function was so chosen as to give convenient quantities for plotting and to give relatively few negative values. The same function has been used for plotting the properties of each of several mixtures of oil and gas. Figure 2 covers the same range of tem-

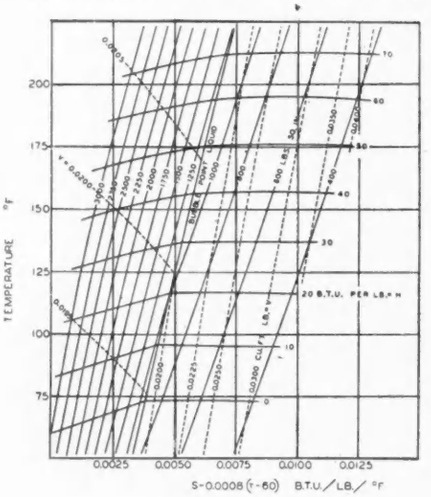

FIGURE 2
Temperature-Entropy Chart for the Mixture Containing 3.253 Mass Percent of Gas, Using an Entropy Function to Aid in Isothermal Interpolation.

perature and pressure for the same mixture as did Figure 1 (3.253 mass percent of gas, or a gas-oil ratio of 199.4 cubic feet per barrel) but lines of constant volume and constant heat content have been added. To obtain the value of entropy from the diagram for a given state, the corresponding value of the abscissa is added to 0.0008 (t — 60).

Similar diagrams are shown in Figures 3, 4, and 5 for the crude oil alone and for mixtures containing 5.611 and 10.94 mass percent of gas, respectively. The gas-oil ratios corresponding to these two mixtures are 352.5 and

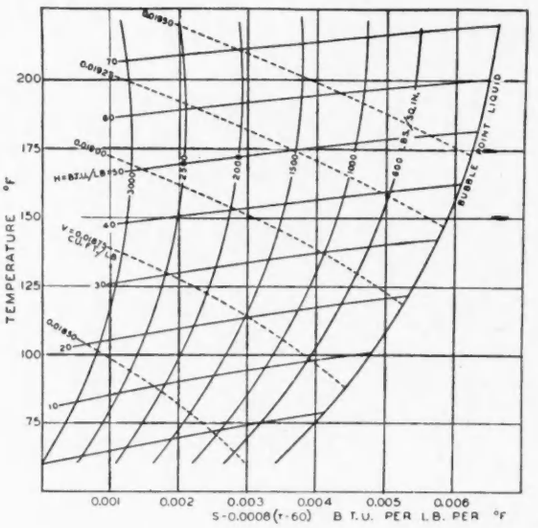

FIGURE 3
Temperature-Entropy Chart for the Crude Oil.

728.2 cubic feet per barrel, respectively. In each one of these diagrams (Figures 1 to 5) the values of entropy and heat content are based upon an arbitrarily-chosen datum. Both properties have been given the value of 0 at 60°F. and at 3000 pounds per square inch pressure. This arbitrary choice for each separate composition makes it impossible to relate directly entropy or heat-content values for one mixture with those of another without further experimental data on heats of solution of the gas in the oil as a function of composition. These

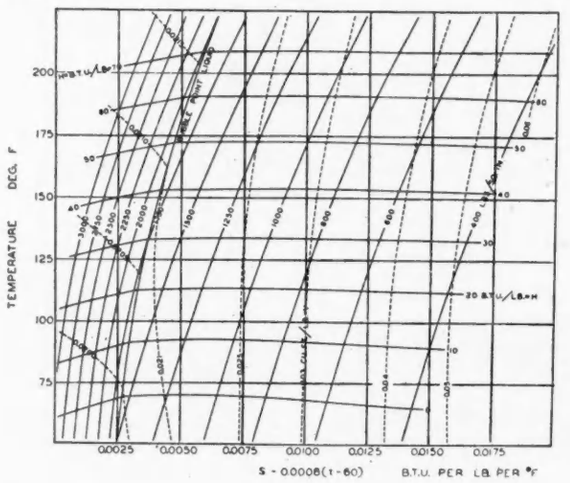

FIGURE 4
Temperature-Entropy Chart for the Mixture Containing 5.611 Mass Percent of Gas.

data are not available at present. The variation of properties with composition is, however, systematic; and the values obtained from the different diagrams can be utilized to interpolate corresponding values for intermediate compositions. Diagrams for such interpolation are illustrated in Figure 6, which shows the variation of the

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entropy function with composition for 160°F. at each of a series of constant pressures.

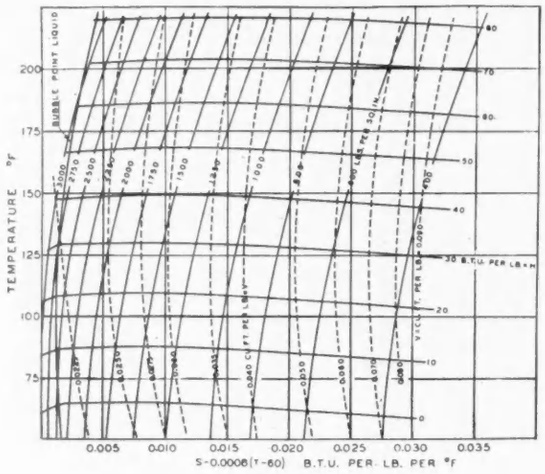


FIGURE 5
Temperature-Entropy Chart for the Mixture Containing 10.94 Mass Percent of Gas.

Field Data

As indicated above, the application of the information just presented to the case of the flow of the production mixture of oil and gas up through the tubing depends upon a knowledge of the temperature and the pressure in the tubing at various depths. Recording instruments are available for making such measurements during flow. In the present case such temperature

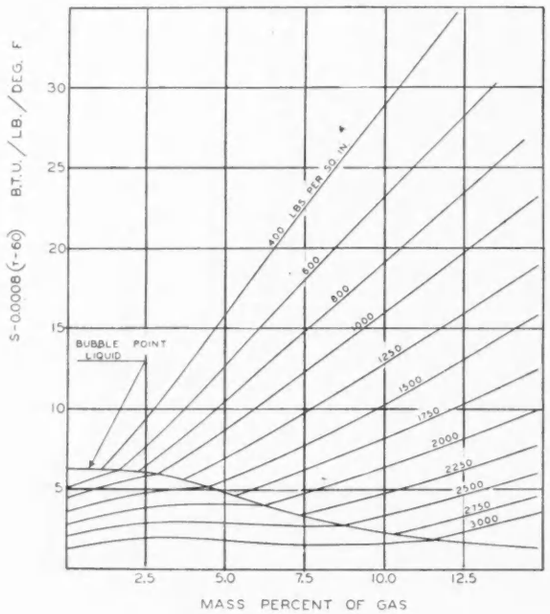


FIGURE 6
Interpolation Chart for Entropy as a Function of Composition at 160°F.

and pressure traverses were made in the same well just after the oil and gas samples had been taken. The results are given in Figure 7 by the points for the curves labelled "actual." At the time, the well was producing 120 barrels of gross oil per day at a gas-oil ratio of 848 cubic feet of gas per barrel of gross oil. On the basis of net oil, the production rate was 112 barrels at a gas-oil ratio of 909 cubic feet per barrel—both gas and oil being measured at 60°F. and at 14.73 pounds per square inch, absolute. These values were based upon an average measurement of production for a two-hour period within the four hours required to make the traverses. The effect of the instrument and its piano-wire line were neglected, but the rate of production was held as near constant as feasible throughout the traverse time.

The water level in the bottom of the well was at a depth of 5600 feet below surface, while the bottom of the tubing was 600 feet higher. The tubing had an inside diameter of 3.06 inches to a depth of 4183 feet, while below this point the diameter was 2.46 inches.

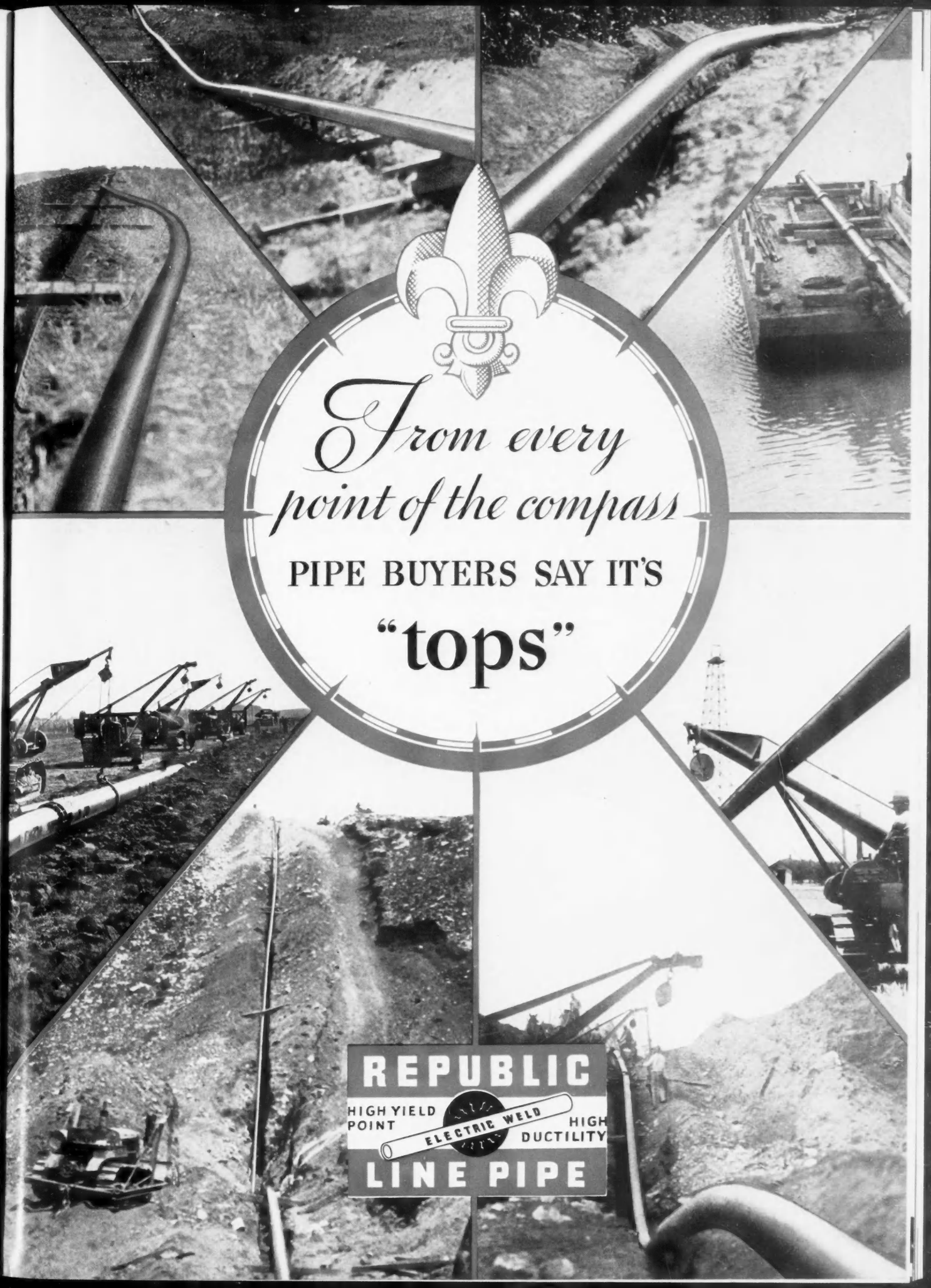
Calculation of Energy Quantities Involved in Flow

In order to make clear the underlying assumptions and the methods of calculation, it is proposed to follow them here in some detail, at the risk of discusing parts of the method with which the reader is already entirely familiar. During the discussion the following symbols will be used:

Symbols:

P = absolute pressure, lb. per sq. in.
V = specific volume, cu. ft. per lb.
T = temperature, °F., absolute, °R. (Rankine scale).
S = entropy, B.t.u. per lb. per °R.
H = heat content, B.t.u. per lb. (also called total heat or enthalpy).
E = internal energy, B.t.u. per lb. (also called intrinsic energy).
Z = elevation, ft. above arbitrary datum (surface of ground).
u = mean linear velocity of flow parallel to the axis of the tubing at any cross-section, ft. per sec.
Q = heat absorbed from the surroundings, B.t.u. per lb. of fluid flowing.
W = external work done by the system upon the surroundings, B.t.u. per lb. of fluid flowing.
F = mechanical energy transformed (irreversibly) to thermal energy as a result of frictional processes (including movement of fluids past the tubing walls and movements within the fluid such as turbulence and slippage), B.t.u. per lb. of fluid flowing.
g = acceleration due to gravity, ft. per sec. per sec.
d = differential.
δ = infinitesimal which is not an exact differential. Subscripts $_1$ and $_2$ refer to sections at different points along the tubing taken at right angles to the axis.

Assumptions: For the purposes of these calculations, it is assumed that the system under consideration is in a steady state with regard to time. In other words, fluid enters the bottom of the tubing continuously and at a constant rate—the same being true of the fluid leaving the top of the tubing. Actually, precautions were taken to approximate this condition as closely as possible both before and during the field measurements. It is realized that where two phases of different densities are flowing upward through a vertical tube, there will be a tendency for the denser liquid phase to lag behind the gas phase. As soon as a steady state of flow has been established, this "slippage" reaches a constant extent, and has the same effect as if a certain extra amount of the prevailing liquid phase remained stationary at each cross-section of the tubing in addition to the flowing fluid passing through the section. For simplicity, it could be considered as a sort of "liner" of liquid next to the wall of the tubing supported as a result of the frictional effect of the fluid flowing past it. Actually, this liquid would be moving on and being replaced by mixing with that in the flowing stream; but, since the quantity and composition would reach a steady state at any section,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it could be thought of as stationary for this analysis. Except near the critical state of the total mixture, the thermodynamic properties of the flowing fluid would not be altered by the presence of this additional liquid, which would have the same composition at each cross-section as the flowing liquid phase at that same section, due to the actual intermixing. The presence of this "stationary" liquid would not have any influence upon the static pressure in the tubing; since it is fully supported as a result of frictional effects, and thus does not contribute to the hydrostatic head of the flowing column.

Its presence will, of course, serve to decrease the effective cross-sectional area of the tubing, and thus have an effect upon the average velocity of the flowing fluid. The specific volume and other thermodynamic properties of the flowing fluid mixture would thus correspond to the pressure found by the field measurements.

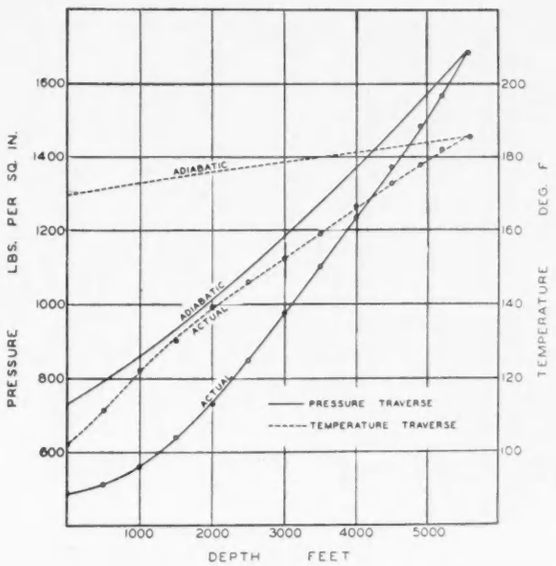


FIGURE 7

Field Data Showing Temperatures and Pressures in the Tubing at Various Depths Below the Surface.

It is assumed that, at any cross-section of the flowing stream taken at right angles to the axis of the tubing, the materials present are a equilibrium with each other, at the same temperature and pressure. The average composition at any cross-section would be the same at one time as at any other if a steady state had been established. These conditions would be most closely realized with decidedly turbulent flow. Fortunately, small divergences from equilibrium conditions do not cause significant errors in the present problem. It is also assumed that the amount of heat which is conducted from section to section of the system through the fluid is negligible as compared to the other energy quantities involved in the flowing process.

Derivation of equations: Although the necessary thermodynamic equations have all been in common use, it is well to follow them through briefly in order to be clear as to what limitations may be implicit. Since the system, as assumed, operates in a steady state of continuous flow with no material added or withdrawn in side streams from bottom to top of tubing, the principle of conservation of energy may be applied in the general form of the Bernoulli equation:

$$E_1 + Z_1 + P_1V_1 + \frac{u_1^2}{2g} + Q - W = E_2 + Z_2 + P_2V_2 + \frac{u_2^2}{2g} \quad (1)$$

These additive terms must be in consistent units; and, although the necessary conversion factor is not shown in this and following equations, it should be understood that in evaluating the energy terms they will be assumed here to be converted to B.t.u. per pound of material. These terms have the usual significance as discussed in any text book on hydraulics, or as indicated in the tabulation of symbols above. The term E represents the energy possessed by one pound of the flowing mixture due to the molecular configuration and molecular motion within it under the conditions prevailing at any designated cross-section of the flowing stream; Z represents the potential energy possessed by the sample at the given cross-section; PV represents the energy required to push the sample past the section against the prevailing pressure; and $\frac{u^2}{2g}$ represents the kinetic energy possessed by the sample as it crosses the section.

Equation (1) may be expressed in a differential form, taking into account the fact that $E + PV = H$, and that there is no external work done by the flowing fluid between the bottom and the top of the tubing, as follows:

$$\delta Q = dH + dZ + \frac{udu}{g} \quad (2)$$

In this case the heat absorbed, δQ, is infinitesimal, because the sections are taken only an infinitesimal distance, dZ, apart.

Instead of using the complete energy balance shown above, one may strike a balance of mechanical energy alone, as follows:

$$Z_1 + P_1V_1 + \frac{u_1^2}{2g} + \int PdV - W = Z_2 + P_2V_2 + \frac{u_2^2}{2g} + F \quad (3)$$

in which $\int PdV$ represents the work done by the fluid upon itself due to expansion during flow from Section 1 to Section 2. F represents the mechanical energy lost as such between the sections, being converted into thermal energy as a result of frictional effects. It must be realized that this quantity, F, combines several different frictional effects, as indicated in the table of symbols above. It is impossible, by the methods here presented, to determine the magnitude of any one of these contributing effects, and they can only be evaluated as a whole. As stated above, $W = 0$ for the case of the well tubing. Although equation (3) contains only terms involving mechanical energy, its validity is in no way affected by the transfer of heat to or from the system. Expressing equation (3) in differential form,

$$\delta F = -dZ - \frac{udu}{g} - VdP \quad (4)$$

If one knows the pressure and the temperature existing during flow at various depths within the tubing, together with the rate of production and the specific volume of the material flowing as a function of pressure and temperature, equation (4) furnishes a means of calculating the quantity F. Unfortunately, in many cases the accurate evaluation of $\int VdP$ requires experimental P-V-T measurements of high precision, and is particularly sensitive to small changes of composition of

the material. For this reason, it is desirable to have an alternate method of evaluating F.

By combining equations (2) and (4), one finds that:

$$\delta F = dH - \delta Q - VdP \qquad (5)$$

The quantity dH is a function only of the initial and final states of the system, and is independent of the thermodynamic path by which the change is accomplished, and may be expressed in relation to the most convenient process between the given initial and final states. For the present purpose, it is most convenient to choose a reversible process which follows the same thermodynamic path as does the actual process. In the case of such a reversible process:

$$dH = TdS + VdP \qquad (6)$$

both terms on the right-hand side of the equation being related to the thermodynamic path followed by the actual process. This value of dH may now be substituted in equation (5), giving the equation:

$$\delta F = TdS - \delta Q \text{ or, in integrated form, } F = \int TdS - Q \qquad (7)$$

Equation (7) offers the desired alternate way of determining the value of F. The value of Q may be determined by means of equation (2); and $\int TdS$ may be obtained graphically by laying out, on an absolute temperature-entropy diagram for the mixture flowing, the series of points corresponding to the states indicated by the field measurements at various depths, connecting the points by the most probable curve and obtaining the area between this curve and the entropy axis of the diagram. This method of evaluating F has the disadvantage of requiring complete thermodynamic information regarding the flowing mixture, but has the great advantage of furnishing more accurate values of F in

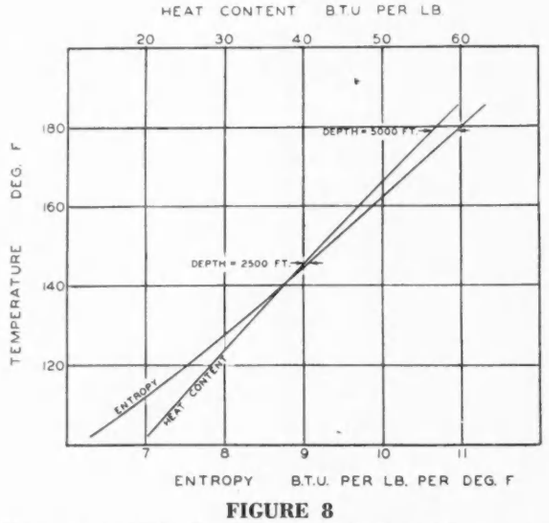


FIGURE 8

Thermodynamic Paths of Flowing Fluid on Temperature-Entropy and Temperature-Heat Content Plots.

most cases. It should be remembered that both methods are based upon the premise that phase equilibrium is maintained in the flowing fluid as it passes through the tubing, a condition probably approximated within engineering accuracy in most cases of turbulent flow. In the results presented here, the amounts of energy transformed as the result of friction were calculated by using equation (7). In the evaluation of Q by integration of equation (2) for the present case of flow in well tubing, the term involving u was found to be negligible in comparison to the other terms.

Results of calculations: Figure 8 shows the thermodynamic path of the flowing fluid in the tubing of the well studied, plotted upon a temperature-entropy diagram. This "path" consists of the series of states through which the fluid passes during its travel through the tubing. In obtaining the area under the curve for use in equation (7), absolute temperatures must be used in-

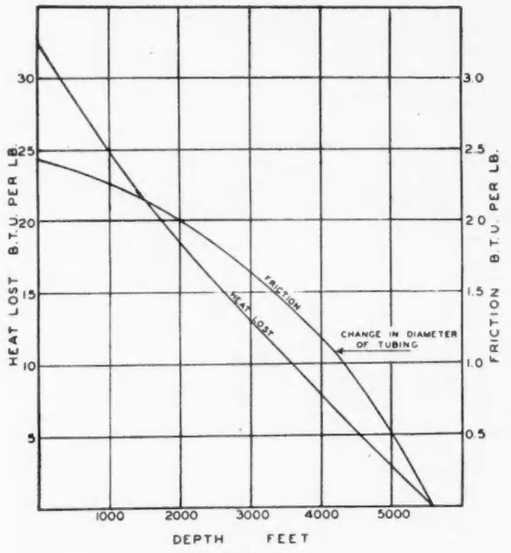


FIGURE 9

Cumulative Plots of Heat Lost Through the Tubing Walls and of Energy Involved in Frictional Effects as Functions of the Depth Below Surface.

stead of the Fahrenheit temperatures shown in the figure. The latter were shown here in order to correspond to the values given in Figure 7. The path is also shown upon a temperature-heat content diagram in Figure 8.

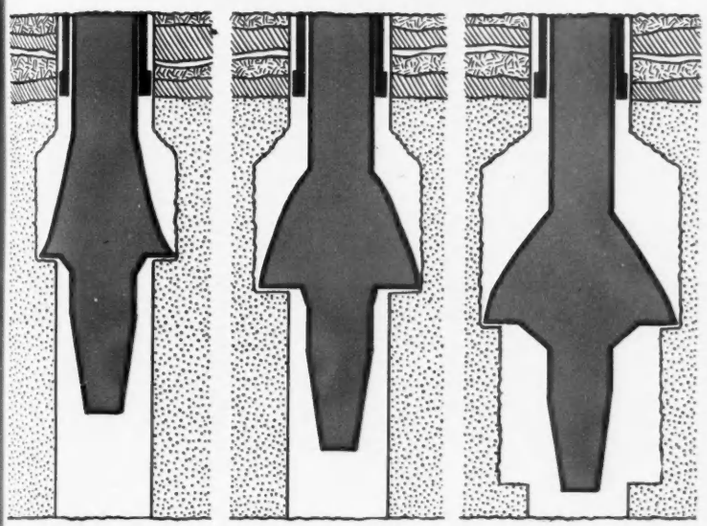
Integration of equations (2) and (7) between limits corresponding to the bottom of the well and each of a series of different points up the tubing gave values of Q and F, which served as the basis for preparing the curves of Figure 9. These values are based upon the assumption, previously stated, that equilibrium is maintained between liquid and gas phases during flow. It is entirely possible that such equilibrium may not be completely attained. It is thought by the authors that the most important effect of such super-saturation would be somewhat smaller values of F than are here shown.

The specific volume, V, of the flowing mixture at various depths in the well is shown in one of the curves of Figure 10. It will be seen that the volume occupied by one pound of the mixture has more than doubled during ascent from the bottom of the tubing. This causes increased velocity in the tubing at the higher levels, as shown in the second curve of Figure 10. It should be pointed out that the values shown are average velocities in the tubing, and that the actual velocity in the flowing stream may be somewhat higher than the values here shown, as a result of the slippage discussed under the heading of "Assumptions." The discontinuity in this velocity curve is due to the change in size of tubing at a depth of 4183 feet below surface.

The energy required to elevate one pound of the mixture from the bottom of the well to the surface was 5600 foot/pounds, or 7.2 B.t.u. Figure 9 indicates that more than four times this amount of energy was dissi-

OPEN-UP the "PAY" formation with THE "ROE Pay" UNDERDIGGER FOR GREATER OIL RECOVERY from New and Old Wells

HOW IT OPERATES

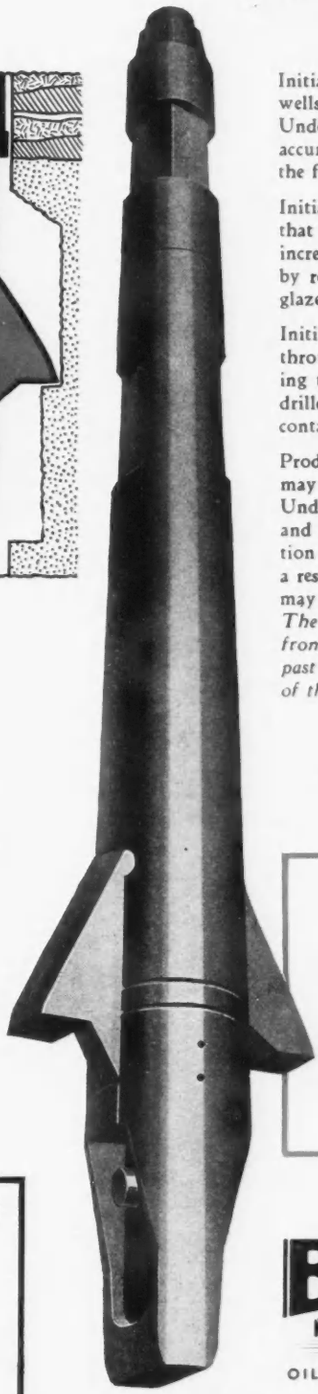


1—A special set of "starting cutters" are used to open the hole below the casing. These cutters are designed to dig their way into the walls of the hole forming the shoulder on which the underdigging operation is started. *This shoulder may be made at any point desired below the casing.*

2—After the shoulder has been made, the "starting cutters" are replaced by a set of underdigging cutters, and the operation of increasing the diameter of the hole is then carried to the bottom, or to any point desired, of the hole.

3—Enlargement of the hole is governed by the size of the underdigging cutters used. In reconditioning old wells, the walls of the "pay" formation may be cleaned and the diameter of the hole increased at several succeeding operations as little as one inch at a time, or the maximum enlargement of more than double the drilled diameter of hole may be made by using only the No. 2 and No. 3 underdigging cutters.

Ordinarily only three sets of cutters (furnished with each sale or rental tool) are required: No. 1, "starting cutters"; No. 2 underdigging cutters enlarge the diameter of the hole approximately 50%; and No. 3 underdigging cutters increase the diameter of the hole approximately double its original size.



Initial production of both rotary and cable tool drilled wells may be increased through use of the Roe "Pay" Underdigger by removing mud, cement and other accumulations from the face of the "pay" to facilitate the free flow of oil into the hole.

Initial production in wells with "tight" formations that have been "shot" one or more times may be increased through use of the Roe "Pay" Underdigger by removing that part of the formation that has been glazed and closed by the heat of the "shot."

Initial production in "lime" wells may be increased through use of the Roe "Pay" Underdigger by enlarging the "pay" formation area to more than double its drilled size that the chemicals used in acidizing may contact a greater wall area.

Production in old "sand", "lime" or "shale" wells may be increased through the use of the Roe "Pay" Underdigger by removing paraffin, gypsum, salt, mud and other obstructions from the walls of the formation for the free flow of oil into the hole. If desired a reservoir more than double the drilled size of the hole may be formed at any point in the "pay" formation. *The Roe "Pay" Underdigger has increased production from 15% to over 200% on many wells during the past two years. Results have been outstanding on 95% of the wells on which it has been used.*

U. S. Patent No. 2012775

SIMPLICITY OF OPERATION

Any practical driller, who observes the simple operating instructions furnished with the Roe "Pay" Underdigger, can run it and do a good job without previous experience. Powerful and rugged, with only six parts including the two cutters, it runs in and pulls out of the pipe as smoothly as a string of tools and even under adverse conditions there is practically no danger of leaving any part of the tool in the hole.

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GREATER ECONOMY AND LONGER LARGER CORES

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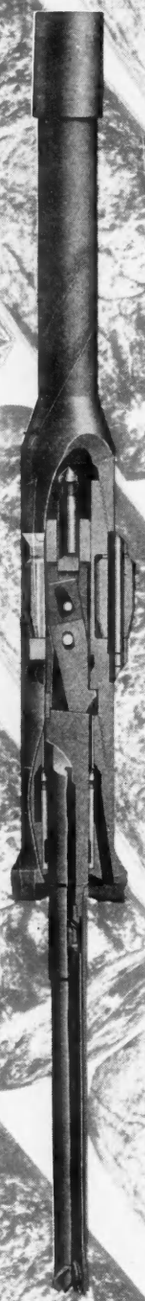
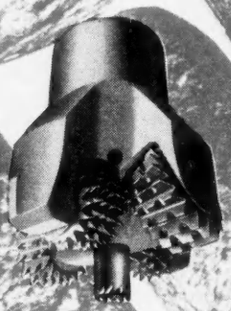
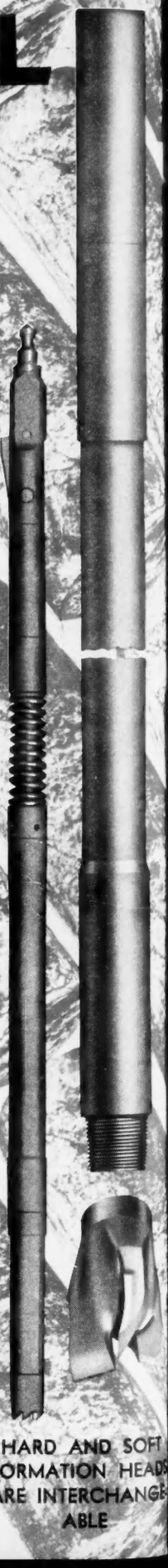


REED "B-R" WIRE LINE RETRACTABLE CORE BARREL

ANY NUMBER OF CORES MAY BE TAKEN (REGARDLESS OF DEPTH) WITHOUT REMOVING THE DRILL PIPE IN ANY FORMATION



THE B-R HARD FORMATION HEAD



HARD AND SOFT FORMATION HEADS ARE INTERCHANGEABLE

REED WIRE LINE COLLAPSIBLE BLADE DRILLING BIT AND CORE BARREL

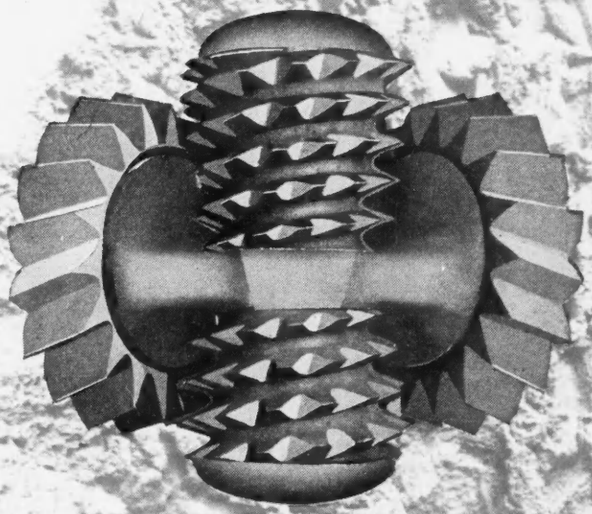
ESPECIALLY ADAPTED FOR DRILLING AND CORING HEAVING OR UNCONSOLIDATED AND GAS BEARING FORMATIONS

DEPENDABILITY

THERE IS A

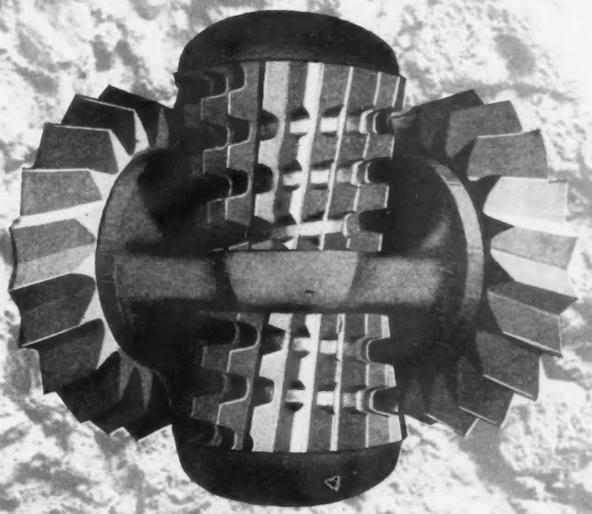
REED ROCK BIT

WITH CUTTER LAYOUTS BEST DESIGNED TO DRILL KNOWN FORMATIONS MOST EFFICIENTLY



REED MULTI-DUTY BIT

A general purpose bit especially adapted to drilling broken formations, such as: alternate hard and soft layers or strata; semi-hard shales; limestones; chalks, etc.

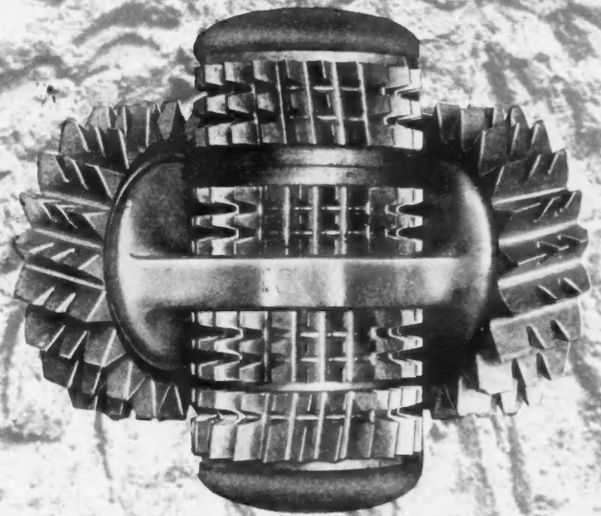


REED TOUGH FORMATION BIT

For hard and tough formations, such as: hard limestones; sand rock; hard shales; and harder formations than those on which the Multi-Duty Bit is generally used, but not in hard formations such as granite, basalt, etc.

RUGGED

FOR HARD DRILLING WITH HEAVY DRILLING WEIGHTS



SPEEDY

FOR STRAIGHT HOLE DRILLING WITH LIGHT DRILLING WEIGHTS

REED HARD ROCK BIT

For cutting hard, well cemented sandstones; very hard limestones; and, when equipped with "D" Type Teeth, for granite, basalt, etc.

SEE OUR CATALOG ON PAGES 1075 TO 1126 IN THE NEW COMPOSITE CATALOG

REED ROLLER BIT COMPANY

pated to the surroundings in the form of heat. The energy involved in frictional effects at the existing rate of production was approximately one third of that required for elevating the fluid. If no frictional effects were present and no heat was permitted to leave the fluid, the pressure and temperature traverses with depth would correspond to the curves in Figure 7, labelled "adiabatic." Under these conditions the pressure drop during flow at the same rate would be approximately 200 pounds per square inch less than the actual drop, while the temperature of the production stream at well head would be approximately 70°F. higher. The change in temperature of the flowing fluid due to its expansion is small in the present case as compared to that which would be expected with high gas-oil ratios.

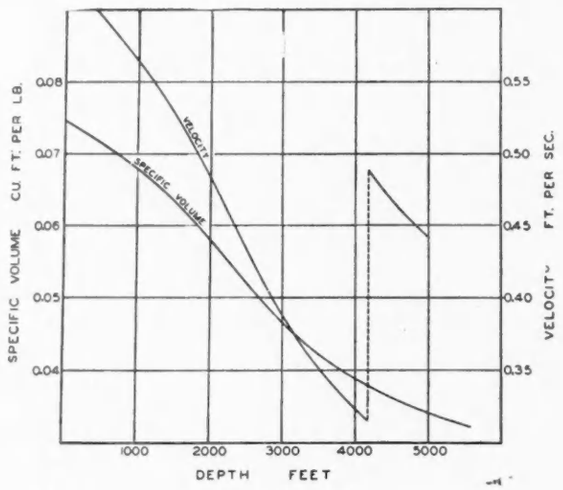


FIGURE 10

Average Velocity of Flow and Specific Volume of Flowing Fluid as Functions of the Depth Below Surface.

Acknowledgments

The authors wish to express their indebtedness to the American Petroleum Institute for financial aid in this work, which was prosecuted as a part of the Institute's Research Project 37.

The Union Oil Company of California has made a valuable contribution to this study by furnishing the able cooperation of its production department in obtaining the necessary samples and field data. Especial thanks are due to Howard Pyle in this connection.

H. S. Backus and J. E. Sherborne assisted materially in the experimental measurements.

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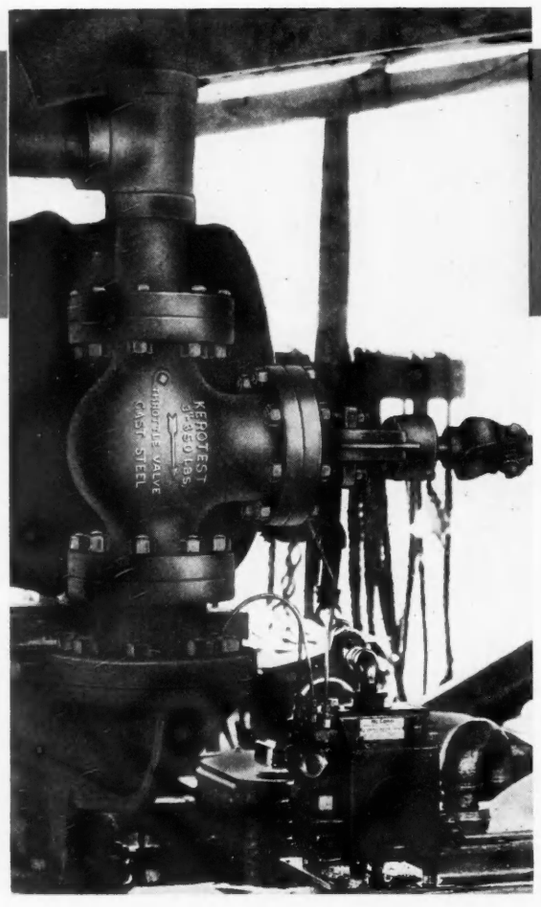

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Present Production Methods . . . OKLAHOMA CITY FIELD

By FRED A. LICHTENHELD
Indian Territory Illuminating Oil Company
Oklahoma City, Oklahoma

BEFORE THE ANNUAL MEETING OF THE MID-CONTINENT DISTRICT, AMERICAN PETROLEUM INSTITUTE, DIVISION OF PRODUCTION, FEBRUARY 20 AND 21, 1936, WICHITA, KANSAS.

IN ITS early days, the Seminole field was a proving ground for equipment and methods of producing oil from wells of 4500 feet in depth. The Oklahoma City field is a proving ground of production practices for wells of 6500 feet in depth. Six different methods are employed successfully in the production of crude oil within that area. Broadly stated, these may be listed as (1) natural flow, (2) gaslift and various gaslift devices, (3) electrical submerged centrifugal pump, (4) pneumatic pumping cylinder, (5) walking beam, and (6) hydraulic submerged pump. A possible seventh may be called a reciprocating hydraulic head type. With the exception of one, the general principles involved in each type have been used for years in other industries and have been adapted for oil field practices. The required changes in making the various types applicable to the oil field have made such production methods appear new. Nevertheless, our methods of producing oil today are based upon old and used ideas.

The Oklahoma City field is classified by the Oil & Gas Conservation Department of the Corporation Commission of Oklahoma as Wilcox, Simpson, Cleveland, and Lime zones, which may be considered as separate pools. The Wilcox and Simpson are now the most important producing horizons. The total known recovery to January 1, 1936, from each zone is as follows:

	Barrels
Wilcox zone	201,060,238
Simpson zone	82,750,578
Lime zone	17,095,435
Cleveland, Detrital, and Simpson above Wilcox zones	818,320
Total	301,724,571

This production was obtained from a total of 1173 wells now classified as:

Wilcox Zone:	
Producing wells	555
Abandoned	18
Simpson Zone:	
Producing wells	338
Abandoned	65
Cleveland Zone:	
Producing wells	23
Lime Zone:	
Producing wells	31
Abandoned	5
Total producing wells	947
Total gas wells (plugged back)	138
Total abandoned wells (all zones)	88
Grand Total	1173

Of the 947 producing oil wells, only 70 are natural flowing and 726 wells are producing by artificial means, while 155 are either shut down or being reconditioned. The 726 wells artificially produced may be classified according to the following production methods:

Gas-lift	136
Gas-lift flow devices	124
Electrical centrifugal pump	54
Pneumatic pumping heads	11
Walking beam	400
Hydraulic (submerged) pump	1
Total	726

When wells cease flowing naturally, gas-lift has been the most popular method of production applied. As production declined, there was a more urgent need for gas-lift efficiency. As a result, a substantial improvement in well equipment and technique was used with the gas-lift. This naturally led to the use of various gas-lift flow devices, some of which claimed a gas-oil ratio of 500 to 2000 cubic feet per barrel of fluid lifted.

Many of these devices were designed to maintain or increase submergence and at the same time prevent the injected gas pressure from exerting its effect upon the producing horizon. This is accomplished by means of (1) packers, (2) standing valves, (3) pneumatic displacement chambers, or (4) bottom hole displacement pump.

A conventional gas-lift well is tubed with two-inch or 2½-inch external upset tubing, usually set just above the shoe of the oil string. Gas is introduced through tubing from high pressure gas lines carrying 500 to 1000 pounds pressure, and the flow returned through the annular space between the casing and tubing. As the formation pressure declined to approximately 300 pounds, continuous gas-lift became inoperative. At this point intermittent gas-lift became widely used, resulting in a saving in gas. To intermit the gas at periods best suited to each individual well condition, a variety of timing devices consisting of clock-operated-pilot-motor-valve were used. This mechanical device enabled the operator to synchronize the period of injected gas with the fluid entrance into the hole.

In spite of the additional cost, some operators continued to use the gas-lift with bottom-hole mechanical intermitters, while others put their wells on the beam. Today 56 percent, or about 400 wells, are producing

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In its plastic state, AQUAGEL-Cement can be pumped directly into a body of water or mud without losing its form or becoming thinned out. Therefore, it *does not channel*, like Neat Cement. Due to the lubricating qualities of the AQUAGEL, it is easier to pump.

When set, AQUAGEL-Cement has *less shrinkage* because no free water settles out; it is much more impermeable because the colloidal particles in the AQUAGEL are dispersed throughout the voids in the Cement, and when proper proportions are used, AQUAGEL-Cement is actually *stronger* than Neat Cement.

Many large companies are using AQUAGEL-Cement as standard practice. Let the BAROID Service Engineer in *your* territory prove its value to *you!*

ORDINARY NEAT CEMENT

1. Loses Free Water
Causes shrinking of cement, permitting passage of formation water through crevise not completely filled.

2. Difficult To Handle
Requires continued high pump pressure to be circulated. Cause of heavy wear on pumps.

3. Flattens Like Water
Seeks its own level, causing high percentage of loss in formation. "Fingers" badly.

4. Easily Contaminated
Pollution by mud and water ruins many neat cement jobs.

5. Poor Metal Protection
Casing and cementing equipment are easily corroded.

AQUAGEL CEMENT

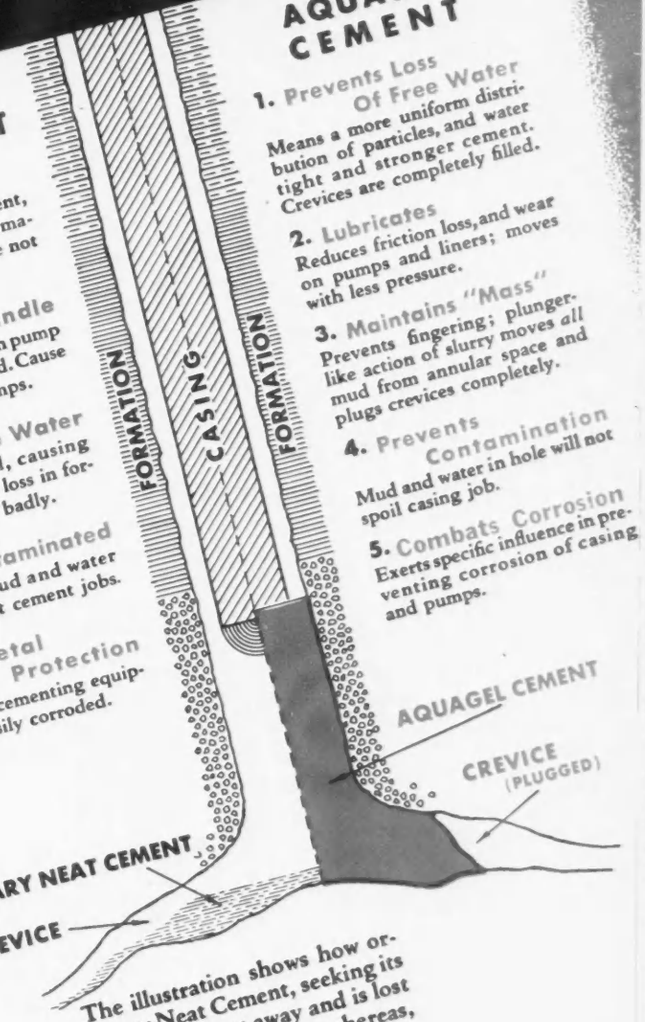
1. Prevents Loss Of Free Water
Means a more uniform distribution of particles, and water tight and stronger cement. Crevices are completely filled.

2. Lubricates
Reduces friction loss, and wear on pumps and liners; moves with less pressure.

3. Maintains "Mass"
Prevents fingering; plunger-like action of slurry moves *all* mud from annular space and plugs crevices completely.

4. Prevents Contamination
Mud and water in hole will not spoil casing job.

5. Combats Corrosion
Exerts specific influence in preventing corrosion of casing and pumps.



The illustration shows how ordinary Neat Cement, seeking its own level, flows away and is lost in formation crevices; whereas, AQUAGEL-Cement piles up, completely plugging crevice.

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in this manner. More wells are being put on the pump daily.

Many types of surface pumping equipment are used by the operators. These may be classified as:

1. Band wheel single crank units.
2. Twin crank units.

The band wheel type of power transmission is driven by belts or chains and powered by single-cylinder or multi-cylinder gas engines. Most band wheels use the single crank with rotary counterbalance. The jack post, sampson posts, and walking beams are all fabricated from structural steel and set upon concrete foundations. Belts are either flat or V-shape, using an idler between the engine and counter-shaft, or between the counter-shaft and band wheel, or both. Multi-cylinder engine installations are mounted upon slide rails, eliminating one idler.

Twin crank units are either gear, V-belt, or chain-driven, powered by multi-cylinder engines. In this type of equipment, the engine base, reduction drive, and sampson post are all mounted on a structural steel base, making a very compact piece of machinery. Rotary counterbalances are used on units having a 72-inch stroke, or less, and beam type of counterbalance on those having a stroke greater than 72 inches. Both styles of counterbalances have given good results. There are several twin-crank units using compressed-air counterbalancing with an apparent saving in horsepower.

Band wheel installations with single crank are used chiefly because of the self-servicing feature, although this is not always employed. The main disadvantages of this type of surface equipment in the Oklahoma City field are:

1. Difficult to counterbalance.
2. Underdesign of crank shaft.

To correct one of those disadvantages, some supply companies are offering 6½- to seven-inch shafts made of alloy steel.

One year ago, not one twin-crank unit was used in the Oklahoma City field. Today there are 148 units, of which 116 are gear-box transmission; the others are either V-belt or chain transmission. There are many advantages to the users of twin-crank units. The more important are:

1. Lower installation costs.
2. More effective counterbalancing.
3. Smaller horsepower engines required.
4. More compact.

The chief disadvantage of the twin-crank unit lies in the fact that it cannot be used to service the well for rod and tubing jobs. It is used, however, to swing tools, jarring, etc., after the tools have been lowered into the hole with a tractor or winch.

The fluid lifted by beam pumping will vary from 15 to 500 barrels per 24 hours, with some wells recording production in excess of 500 barrels per day. This fluid is pumped by hard metal tight fitting plunger pumps, a large majority of which are the insert variety. Plungers vary from one-inch to 1¾ inches in diameter and, in general, have a minus fit of one to five thousandths, depending upon conditions. Plungers with a minus two fit for 1¼-inch bore pumps, and minus three for 1¾-inch bore pumps have given the best results, although now the general trend is toward a minus two fit throughout. Pumps of larger bore than 1¾-inch have not proven satisfactory in 6500-foot wells, although there are a few being used. Pumping speeds also vary widely, as does the length of stroke. Polish rod speeds of 15 to 23 strokes per minute are common. Experience so far indicates that a polish rod travel of more than 120 feet per minute in 6500-foot wells is not the best practice. Fast, short, strokes (not to exceed 23 strokes per minute) usually produce more oil than long slow strokes in the same well under the same conditions.

It is the custom to use a tapered string of alloy steel rods consisting of 2200 feet of seven eighths-inch and 4300 feet of three quarter-inch. Experience has taught that better service can be obtained by using more seven-eighths-inch rods. The corrosion of subsurface equipment is not general, but there is evidence of sulphur and acid corrosion. While this condition is not serious, it is evident, and one cannot say to what extent corrosion will take place in future operations.

Polish-rod loads vary from 15,000 to 25,000 pounds, but most wells will average from 18,000 to 20,000 pounds maximum.

All beam-pumping wells are equipped with 2½-inch external upset tubing, usually anchored two or three feet off bottom in the Wilcox and some Simpson wells. In wells of higher fluid levels, producing large quantities of water, the pump is set from 100 to 1000 feet off bottom. In the Wilcox area the bottom hole pressure averages about 150 pounds; in the Simpson zone it is somewhat higher, permitting more leeway in spacing the pump. Gas anchors have been used with varying degrees of success, and their use can only be determined by trial. Often gas anchors of improper design have been used only to be condemned. A properly designed gas anchor should be beneficial, but to obtain one to fit a particular well condition is another problem.

As pointed out, many operators have equipped their wells for servicing work, but many use a tractor winch or winches mounted on trucks for rod and tubing jobs, regardless of what is installed at the well. The portable pulling units are used for rod and tubing jobs, bailing, swabbing, and cleaning out purposes, and have a definite place in the production of Oklahoma City crude oil. One pulling unit will service five to 10 wells, and its chief advantages are its flexibility and speed. Rod jobs have been completed in three hours time. Pulling units are also used to run gas-lift strings, hydraulic pumps, etc.

Prime movers vary from 25 to 150 horsepower, and from single-cylinder, two-stroke-cycle horizontal gas engines to six-cylinder vertical engines of the four-stroke-cycle principle. In general, the single-cylinder engines have a horsepower rating which ranges from 40 to 80 horsepower, and operate at 180 to 225 revolutions per minute. The multi-cylinder engines operate at speeds from 400 to 1000 revolutions per minute, with a rating of approximately 40 horsepower. The multi-cylinder engines present a special problem in lubrication and temperature control. Care in the selection of the correct grade of lubricating oil with respect to climatic conditions, regular oil changes, efficient oil and air filters, should add many months of useful service to any internal combustion engine. An engine operating at 800 revolutions per minute, pumping a well 20 strokes per minute, is equivalent to driving a car 384 miles per day, or 11,520 miles per month.

Oil engines have not been used in the Oklahoma City field for pumping purposes.

Several wells are using electric motors as prime movers directly connected to gear reduction units, and these, in turn, drive a band wheel. Triple rated motors of 15-25-40 horsepower are used. The average power consumption is 11 to 13 kilowatts per 24-hours operation. Peak loads run as high as 50 kilowatts, or about 67 horsepower.

[*Continued on page 52*]

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Gas Repressuring In Eastern Kansas

By N. M. HUTCHINSON
Empire Oil and Refining Company,
El Dorado, Kansas

BEFORE THE ANNUAL MEETING OF THE MID-CONTINENT DISTRICT, AMERICAN PETROLEUM INSTITUTE, DIVISION OF PRODUCTION, FEBRUARY 20 AND 21, 1936, WICHITA, KANSAS.

THE term "repressuring" has been broadly and loosely used by those interested in oil production. The use of the term has included water flooding, the air or gas drive, recycling gas produced with the oil, and the partial restoration of original formation pressure. In this paper "repressuring" will refer generally to those operations involving the injection of air or gas into oil sands, and more specifically to the partial restoration of original formation pressures by the use of outside gas. It is believed that the term "repressuring" should be applied to the latter operation, and the term "air or gas" drive should be applied to the operation of returning excess gas not used for fuel, etc. or the injection of air, where no attempt is made to increase the then formation pressures. Water flooding will not be considered in this paper.

Repressuring, including the air or gas drive, has been practiced since 1903.[1] Its value was first discovered by Mr. I. L. Dunn in the Macksburg Pool, Southeastern Ohio, in 1903, and was later applied by Messrs. Dunn and Smith in 1911-16 in Southeastern Ohio and northwestern part of West Virginia with success. The use of repressuring spread to Oklahoma, Kansas, and Texas, gaining considerable impetus by 1925.

The Empire Companies became active in repressuring sand production in Oklahoma and Kansas in 1925. At this time several projects in Texas, Oklahoma, and Kansas were started by them. These projects in Kansas included the air drive in the 650-foot sand in the El Dorado field, and several experimental projects in Greenwood County, in Bartlesville sand production.

Since this paper is to deal principally with repressuring of Bartlesville sand, comment on other projects will be limited to the statement that these have been successful in the main.

Repressuring Bartlesville Sand Production

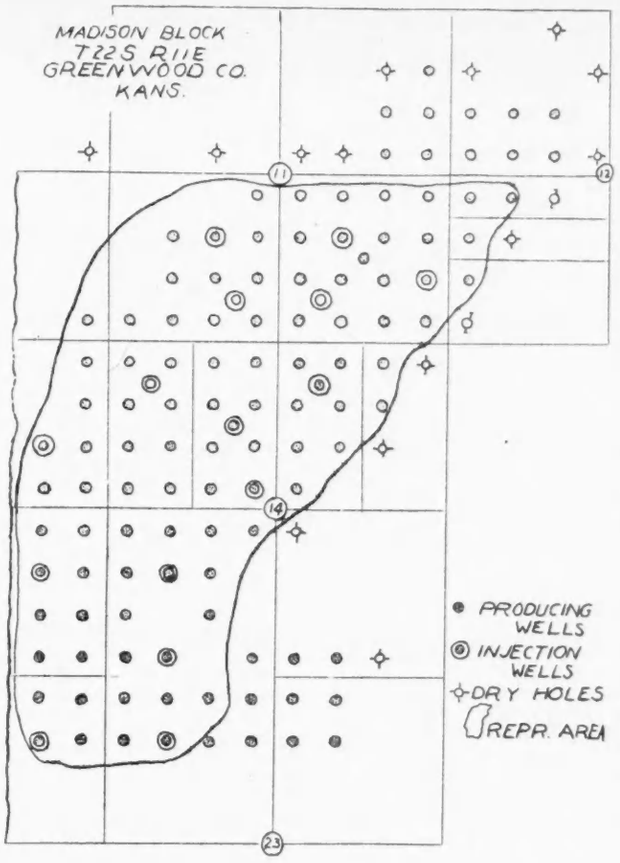
Bartlesville sand is found in "shoe strings" or trends in Kansas, east of the buried "granite ridge" which extends generally in Kansas from the south line of the state, a few miles west of Arkansas City, in a north-northeasterly direction through Augusta, El Dorado, Burns and on to Nemaha County on the north line of the state. This type of production is found principally in Greenwood, Butler, Cowley, Lyon, and Woodson Counties. Other counties to the east have Bartlesville sand production, but the principal production has been obtained from the sands as shown. The nature and extent of these trends has been discussed by N. W. Bass in his bulletin "Origin of Bartlesville Shoestring Sands, Greenwood and Butler Counties, Kansas", published in the October, 1934, Bulletin of the American Association of Petroleum Geologists.

Our check of the Bartlesville sand acreage indicates that there are approximately 30,000 acres under production which had produced, according to F. G. Holl, approximately 120,000,000 barrels of oil in the 10 years preceding March, 1934.[2] The present daily production is approximately 13,000 barrels.

The sand thickness varies from 20 feet to 100 feet. It is well saturated, about 18 percent porosity, quite permeable in the "pay", and is estimated by Bass to produce ultimately probably 7000 to 8000 barrels per acre. Initial productions of wells drilled varied from 100 barrels per day to 800 barrels per day, gas being the motive force to bring the oil to the wells. Generally speaking, these fields have been produced "naturally", with but little attention paid to return of excess gas not needed in operations, not to artificially stimulating production or attempting to increase the ultimate production.

From a general knowledge of the present per-acre yield of leases in these trends, it is believed that the estimate of 7000 to 8000 barrels per acre average is high. There are some leases where ultimate yields under normal operating conditions will exceed 10,000 barrels per acre. There are others, however, which will not exceed 2500 barrels per acre before the economic limit is reached. If it is assumed that the average will be 6000 barrels per acre, these 30,000 acres will yield approximately 180 million barrels under normal operation. After five years experience on five leases in the Madison Block, Greenwood County, and from experience on other projects which have been in operation long enough to establish a decline from which the ultimate can be estimated, it is believed, that this ultimate may be increased 15 to 18 percent by the air or gas drive. As applied to the leases in the trends, this would indicate an increased yield of approximately 30 million barrels. By partial restoration of the original formation pressure,

[1] J. O. Lewis, Bulletin No. 48, U. S. Bureau of Mines.
[2] F. G. Holl discussion of N. W. Bass Bulletin "Origin of Bartlesville Shoestring Sand, Greenwood and Butler Counties, Kansas."



using gas, increased recoveries to date indicate that the ultimate will be increased by 45 percent, or 81 million barrels more than normal production. The possibilities and importance of this process are obvious.

At the present time there are probably not over 12 "repressuring" projects under way in the Bartlesville sand trends shown. Nine of these projects involve approximately 3000 acres. Of these nine, only two are known to be repressuring, the others are of the nature of air or gas "drives". Results from the latter method have been generally to retard the declined production and have to this extent increased the ultimate, by prolonging the time to reach the economic limit.

The two exceptions are the gas repressuring projects of the Empire Companies: one, the Madison Block in Township 22, Range 11 East in Greenwood County and the other at Haverhill in Township 27, Range 5 East, Butler County. Since the latter project has been under way but a short time, and since it is believed that results obtained on the Madison Block will apply generally to Bartlesville sand production in Kansas and Oklahoma, the discussion will be limited to this project.

Repressuring With Natural Gas on the Madison Block

The Madison Block comprises approximately 1150 productive acres, of which 980 acres are under repressuring. Figure 1. Bartlesville sand production is found at depths of 1850 to 1900 feet.

[3] Beecher and Parkhurst, page 51, paper "Effect of Dissolved Gas Upon Viscosity and Surface Tension of Crude Oil." Petroleum Development and Technology, 1926, A.I.M.E.

The average sand thickness is 40 feet, of which 20 feet is "pay". This sand has medium fine grains, well cemented with a porosity of approximately 18 percent. It might be classed as medium hard by those drilling it.

Development of the block under repressuring continued from January, 1923, to June, 1928, over 60 percent of the wells being completed in 1925 and 1926, with 20 percent finished in 1927. There were three wells completed in 1928. There were a total of 101 wells drilled on the part under repressuring of which six were drilled in 1927 on "five-spot" locations expressly for injection wells. Five of these were later used. The average initial production of the 101 wells was 165 barrels per day after shooting, the higher initials being identified with earlier drilling, before the sand pressure had declined. Very little water was encountered in the producing horizon and that has declined in amounts as the wells have been produced.

Repressuring using the air drive was started in October, 1927, on five leases, on which development had been completed, using five injection wells, all of them being the five-spot locations. Referring to Curve Sheet No. 1, it will be noted that these five leases were producing approximately 35,500 barrels per month when air was applied. Air at the rate of approximately 50,000 cubic feet per day was injected into each well.

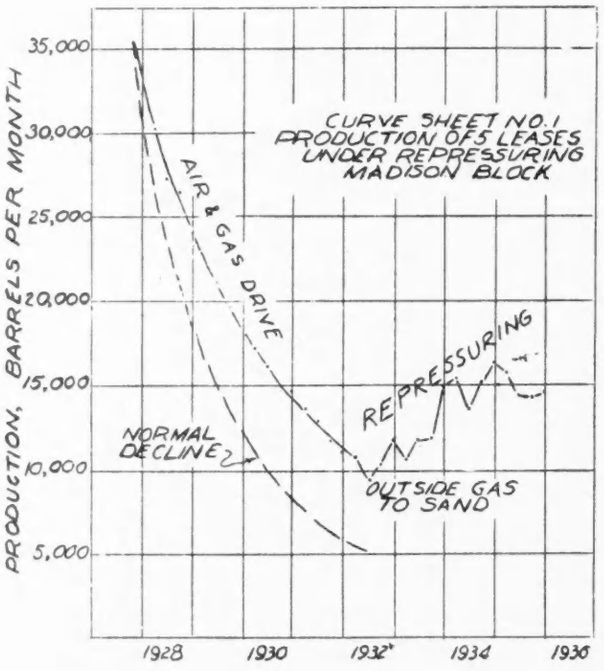
In March, 1928, five months after starting the "air drive" it was necessary to change to gas. There were several reasons for this. In the first place, corrosion of tubing and oil well pump parts became evident; oil emulsions increased and from experience with older properties, the continued use of air would soon dilute the gas, destroy its value as fuel for operations. Another important reason for changing to gas was that the advantage gained by the use of gas instead of air in reducing the viscosity and surface tension of the oil would be of material value in the greater ultimate recovery as pointed out by Henry L. Doherty.[3]

Coincident with the change from air to gas, two additional injection wells were added to the five in operation on the five leases affected. In June, 1928, two more leases were added to those being stimulated by the addition of three key wells. A third lease was added in August, 1928, by adding another key well. As of this date, August, 1928, 11 key wells were in operation on eight leases, and 550,000 total cubic feet of gas was being injected. Gas has been used since March, 1928, with the exception of the period from September 5, 1928, to January 26, 1929, air being used during this period until arrangements were completed for the use of natural gas.

Referring to Curve Sheet No. 1, the solid line, or the upper curve, represents actual gross production (pipe line runs) from the five leases. The dashed line represents decline under normal operating conditions. It will be noted that there was some gain in production during the period from start in October, 1927, to March, 1932. During this period no attempt was made to restore any pressure to the sand, the project being operated as an air or gas drive.

With reference to the entire block of 980 acres during the period of March, 1930, to April, 1932, production declined from 930 barrels per day to 600 bar-

rels per day. During a greater part of this period five and six injection wells were alternated in periods of 30 to 60 days. As gas channeled to producing wells, requiring the application of back pressure, a switch of key wells would be made to another group. Results from the air or gas drive during the period 1927 to 1932 were good only in so far as it retarded the decline. Some leases during this period showed an increase in production. However, we discovered that there was too little energy being added to the sand in comparison to the amount of gas being removed, and that which had already been withdrawn. Therefore, in March, 1932, large quantities of natural gas



were applied to the block in general, affecting 12 leases with 13 key wells. Referring again to Curve No. 1, applied to the five leases, it will be noted that in approximately three months, production began to increase, reaching a peak in December, 1934, higher than the production of June, 1930. The 12 leases in the aggregate showed similar increases.

At the time of starting repressuring, using large quantities of natural gas, there had been produced a total of 4,860,650 barrels from the 980 acres or a per-acre yield of 4960 barrels. It is estimated that the total gas taken from the sand amounted to 2,197,409 M. cubic feet, an over-all gas-oil ratio of 450 cubic feet per barrel. There had been returned to the sand, but not stored, approximately 620,322 M. cubic feet of air and gas during the period from October, 1927, to March, 1932. Also at this time there were 14 key wells connected to the system, five of which were not operated, and 74 wells in the repressured area, of which four were under a slight back pressure. The nine key wells were taking a total of 408 M. cubic feet of gas per day. A gas-oil ratio of 970 cubic feet per barrel of gross production was being obtained.

Referring to Curve Sheet No. 2, the progress of production will be noted. The production of oil fell below the normal decline for six months. This was probably due to injecting too large volumes of gas to the five-spot injection wells, resulting in back pressures on oil wells adjacent to them. The back pressures when applied, reduced the oil production. It must be borne in mind that all of the oil wells except four were producing under practically atmospheric conditions. Production started to increase from the "low" established the fourth month after introducing large quantities of gas to the sand. After the sixth month, the production reached a point above the normal decline and has shown very substantial increases since.

It should be pointed out that drilling five-spot locations is not necessary and better results will be obtained in this type of production by the use of regular 660-foot locations as key wells. The five-spot wells, which have proved unnecessary, added an investment to this project that will be eliminated from future projects.

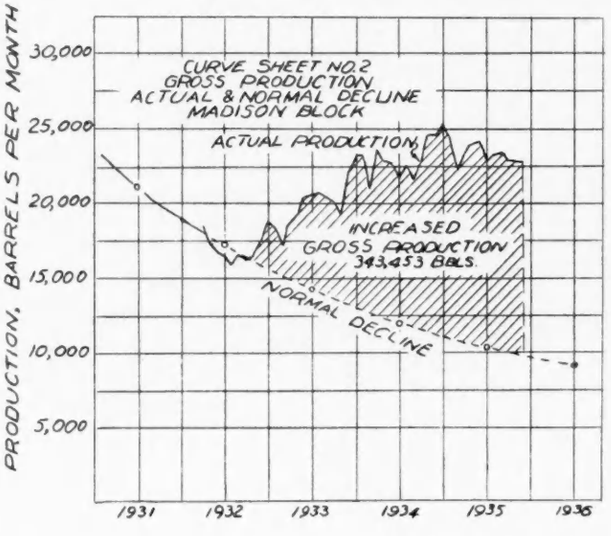
TABLE 1

Progress of Repressuring Results

	12 Months	2 Years	3 Years	3 Years, 8 Months
1. Actual Gross Production—Cumulative Barrels.....	205,754	458,363	737,726	924,183
2. Expected Gross Production—Cumulative Barrels....	195,700	359,375	499,055	580,730
3. Increased Gross Production.	10,054	98,988	238,671	343,453
4. Increased Net Production...	9,261	85,642	204,910	294,981
5. Total Gas Added to Sand...	312,900M	422,236M	564,122M	652,965M

Table 1 shows the progress of repressuring results. It will be noted that at the end of three years and eight months, there had been a gain of approximately 343,000 barrels gross and 295,000 barrels net. The total outside gas used at this time was 1,034,385 M. cubic feet, of which 652,965 M. cubic feet, or 63 percent had been stored. The difference of 381,421 M. cubic feet was used as fuel for pumping powers, compressor plant, dwellings and leakage. At this time there had been a total of 3500 cubic feet of outside gas injected to the sand per net barrel of increased production, of which 63 percent still remains in the sand and is available for producing oil.

Should the use of outside gas be discontinued at this time, the amount "stored" in the sand, 652,965 M., would be sufficient to operate the project for over six years. This time is determined by assuming



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that all gas not returned to the sand would be used for operations. Oil production will depend on the rate of recycling. However, careful attention would be required so as to produce the oil with as low a gas-oil ratio as possible, due to limitations of investment in facilities.

TABLE 2

1. Total Outside Gas as of November 30, 1935	1,074,386 M Cu. Ft.
2. Total Gas in Storage as of November 30, 1935	652,965 M Cu. Ft.
3. Gas used in operations during 3 years, 8 months	381,421 M Cu. Ft.
4. Total Gas Recycled as of November 30, 1935	1,251,886 M Cu. Ft.
5. Total Increased Production—Gross	343,453 Barrels
6. Total Increased Production—Net	294,981 Barrels
7. Cubic Feet Outside Gas per Net Barrel Increased Production	3.5 M
8. Cubic Feet Recycled Gas per Net Barrel Increased Production	4.25 M
9. Length of time before gas in storage would be used in operations should outside gas be discontinued (Item 2 divided by Item 3 and multiplied by 3 years, 8 months)	6¼ years
10. Amount gas to be recycled at present rate of 1,500 M Cubic Feet per day	3,420,000 M Cu. Ft.
11. Increased production on basis of 6,000 Cubic Feet per net barrel (present 4,250 Cubic Feet per barrel)	570,000 Barrels
12. Total increased net production from project (Item 6 plus Item 11)	865,000 Barrels
13. Cubic Feet outside gas per net barrel increased production on basis of discontinuance of outside gas	1,200
14. Cubic Feet recycled gas per net barrel increased production (Item 4 plus Item 10 divided by Item 12)	5,400
15. Estimated ultimate recovery without repressuring	6,400 Bbls. per Acre
16. Total recovery at start of repressuring as of March 31, 1932	4,960 Bbls. per Acre
17. Percent of ultimate at start of repressuring	77.2 percent
18. Total recovery as of November 30, 1935	5,900 Bbls. per Acre
19. Increased recovery net oil due to repressuring and assuming discontinuance of outside gas	882 Bbls. per Acre
20. Increased recovery gross oil under above condition of discontinuing outside gas	1,028 Bbls. per Acre
21. Percent increased recovery gross oil under condition of discontinuing outside gas	16 percent
22. Total gross oil recovery on above basis	7,428 Bbls. per Acre
23. Estimated possible increased recovery 45 percent normal	2,800 Bbls. per Acre
24. Estimated total recovery under repressured condition	9,280 Bbls. per Acre
25. Percentage of possible increase by discontinuing outside gas	34½ percent

Table 2 includes data of past experience and estimates on future recovery assuming two different methods of operation. One, on the assumption that outside gas would be discontinued at this time and the other assuming that it would be indefinitely continued. It will be noted that the estimated recovery under normal operation is 6400 barrels per acre. This figure is quite conservative, since there have been estimates of 7000 to 10,000 barrels placed on this type of production. However, attention is directed to Table 3, where representative leases with an experience of 10 to 14 years have produced only from 2300 barrels per acre to 4500 barrels per acre. Ultimate productions on these leases will hardly be doubled.

Table 2 further points out that the ultimate recovery, if outside gas was discontinued, would be reached in approximately six years with the present recycled gas of 1500 M. cubic feet per day, and that it would amount to 7428 barrels per acre, or an increase over the normal of 1028 barrels, equaling 16 percent, the net increased production amounting to 882 barrels per acre.

Under this condition, the total outside gas per net barrel of increased recovery would amount to only 1200 cubic feet. This amount of gas has not only produced a net barrel of oil, but the presence of the total stored gas has assured the operator of ample fuel for operations during all this time.

Should outside gas be continued, and based on experience on other projects which have established a sufficient decline so as to forecast an ultimate production, it is estimated that the recovery under normal conditions can be increased 45 percent, giving an increased recovery due to repressuring of 2880 barrels per acre and a total ultimate production of 9280 barrels per acre.

TABLE 3

Yield of Bartlesville Sand Leases Not Repressured Greenwood County, Kansas

Lease	No. Wells	Average I. P.	Average Sand Pen.	Total Gross Production	Average per Acre Recovery	Age, Years	Present Daily Production per Well	
							Oil	Water
1	8	191	53′	266,401	3,330	14	2	2
2	11	142	48′	252,046	2,520	13	2	1
3	11	125	55′	446,172	4,461	14	2	2
4	9	174	45′	512,004	5,700	11	3	6
5	6	64–23	48′	141,596	2,360	10	2½	2
Average	..	139.2	50′	.....	3,753	12.6	2.3	2.7

These figues are conservative as applied to this project, since sand conditions as to amount and nature would indicate better results.

It has been pointed out that the difference between outside gas and gas stored is used principally for fuel. Many Bartlesville sand leases in Greenwood and Butler Counties after 12 to 15 years operation are now embarrassed from lack of fuel for operation. All gas stored during repressuring operations is available for these purposes, and in addition perform the very valuable office of producing additional oil.

In Table 4, a comparison is made between three leases operated under normal conditions, selected from the group of five shown in Table 3, and three leases of the same size operated under repressured conditions. The

TABLE 4

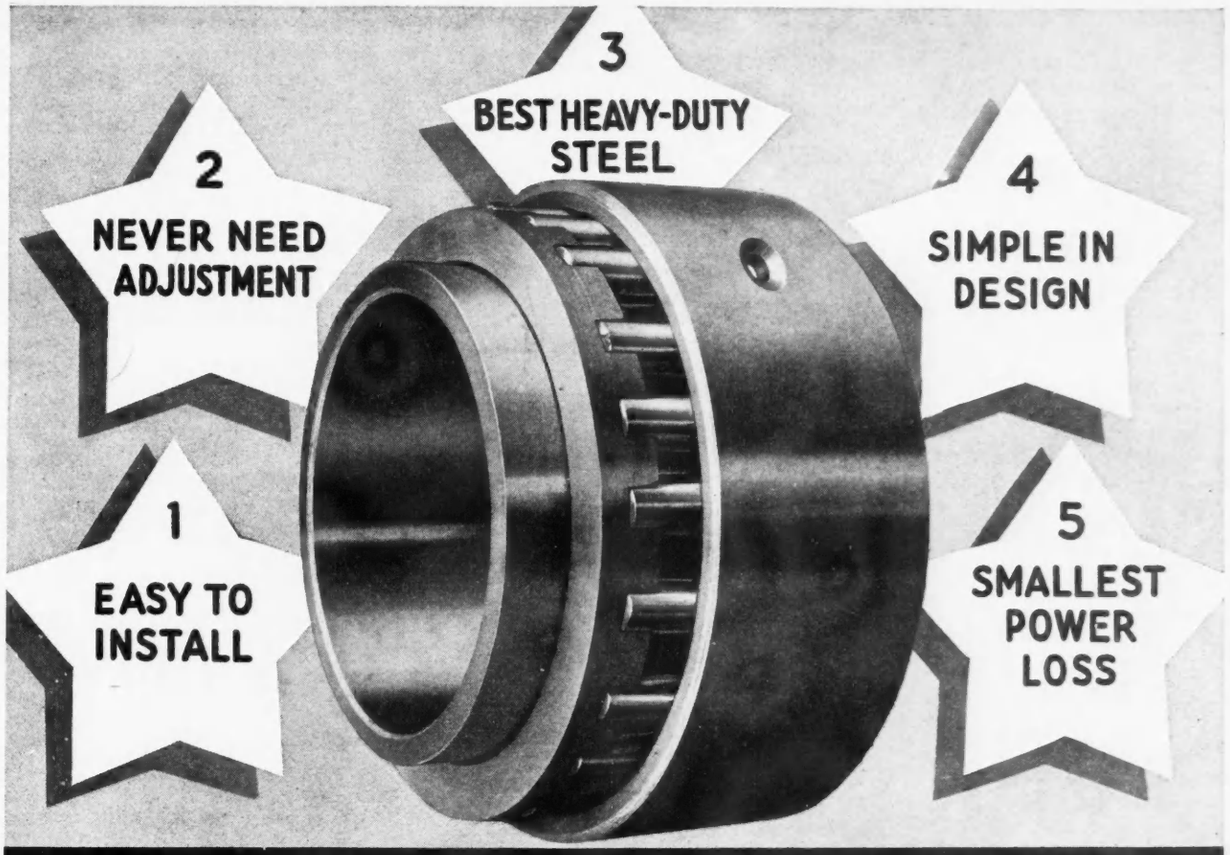
Comparison Yields of Bartlesville Sand Leases Under Normal and Repressured Conditions

Lease	No. Wells	Average I. P.	Average Sand Pen.	Total Gross Production	Average per Acre Recovery	Age, Years	Present Daily Production per Well	
							Oil	Water
Normal Conditions:								
1	8	191	53′	266,401	3,330	14	2	2
2	9	174	45′	512,004	5,700	11	3	6
3	11	125	55′	446,172	4,461	14	2	2
Average	..	160	51′	.....	4,373	13	2.3	3.3
Repressured Conditions:								
1	11	201	32½′	833,440	7,577	10	13½	3
2	8	174	36′	566,056	7,076	10	9	4
3	8	118	42′	447,060	5,588	10½	7½	4
Average	..	168	36′	.....	6,849	10	10.4	3.6

latter are selected from leases in the Madison block on the basis of nearly equal initial productions, giving the advantages of age and sand thickness to the leases under normal operation. It will be noted that the repressured leases have a present yield of 6849 barrels per acre as compared to 4373 barrels per acre, for normally opeated leases, an increase of 2476 barrels per acre, or 57 percent, with an average age of 10 years as compared to 13 years for the normally operated leases. The value of early returns on money invested from leases repressured as compared to normally operated is indicated by the average daily productions per well of the leases. This comparison also points to a much greater yield before the repressured leases have reached the economic limit than the normally operated.

Operating Economics

If the above has pointed out the benefits of using outside gas for partially restoring the original sand pressure, the question still remains as to the cost of gaining these advantages. No attempt will be made in this paper to estimate the investment required to



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install a repressuring system. However, the components of such a plant would be those of an ordinary compression type of gasoline plant with the difference of using a high pressure line to return the residue gas and outside gas to the injection wells instead of the normal low pressure "residue" lines. One well from a group of seven to nine, depending on their location and the size of the lease, will be necessary for an injection well. There will be some expense for the preparation of this well. The casing should be tight, preferably cemented at the top of the sand. It has been our experience that tubing and packer is not necessary. Suitable clean-out preparations must be made before attempting to inject the gas, since the pressure required will have an important bearing on the investment necessary for compressors.

The type and size of compressor plant will be determined by the following factors:

(1) Quantity of recycled and outside gas.
(2) Pressures required to inject satisfactory volumes of gas.
(3) Pressure of outside gas available.
(4) Gas-oil ratios which depend on the oil and gas produced before repressuring with an allowance for increased ratios.

It is realized that the chief difficulty in launching a repressuring project on leases along the Greenwood and Butler County trends would be due to the divided interests operating the leases. It is suggested, however, that with an increase of 45 percent or more in the ultimate recovery and the benefits of early improved daily production to be gained, that satisfactory agreements should not be difficult to work out between operators.

The Madison project has demonstrated to us the necessity for constant and carefully planned operation. There are so many factors involved to determine the most economical investment and operation, that competent supervision is absolutely necessary to obtain the maximum ultimate yield. Constant scientific study and control must be used during the life of the project.

Present Production Methods...Oklahoma City Field

[*Continued from page 44*]

There are approximately 54 submerged centrifugal pumps electrically operated in the Oklahoma City field. These are ideally suited for handling 1200 to 1400 barrels of fluid a day without the aid of gas. With the gas-lift, in addition to the centrifugal pump, under ideal conditions, wells have produced as much as 6000 barrels per day. This method of producing is generally employed to take potentials. Gas-lift pressure of 500 pounds is sufficient to flow this type of well to its maximum capacity. The procedure is to run the electric motor and centrifugal pump on a two-inch string of tubing. About 800 to 1000 feet above this a packer is set. Just above the packer the tubing is perforated. The motor is started, then gas introduced into the two-inch tubing, allowing the fluid to flow in the annular space between the tubing and casing. Power requirements average about 2.5 kilowatt hours per barrel of fluid lifted when used without the gas-lift, but with the gas-lift only 0.8 kilowatt hours are required per barrel of fluid lifted.

The plunger lift is used in approximately 42 wells. Its equipment consists of a string of special smooth-bore tubing in which an alloy steel plunger travels the entire length of the tubing. The function of the plunger is to raise the column of oil, assisted by gas pressure, and automatically unload the oil into a separator at the surface, then returning by gravity for another load. The valve in the plunger closes when striking the foot piece located at the bottom of the tubing. This method of production may operate on the gas produced by the well itself, or, if insufficient, gas may be supplied to the casing from another source.

Plunger lifts are made for 2½-inch, three, and four-inch tubing, of which the 2½ and three-inch tubing sizes are now in general use throughout the field. Production by this method varies from 25 to 350 barrels per day, depending upon the tubing diameters and well capacity. On an average, about 500 cubic feet per barrel per 1000 feet lift is required.

The pneumatic pumping cylinder is used in connection with sucker rods and operates like a steam head. The cylinder is suspended from the crown block in the derrick to a point above the well head. A piston reciprocating in the cylinder is directly connected to the polish rod. Gas is pumped into the cylinder at a pressure of about 325 pounds to cause the lift. The down stroke is cushioned by the gas as it is exhausted to the compressor intake at 150 pounds. The speed of the stroke can be changed, as well as the length of stroke. The amount of gas required for a 24-hour operation is one million feet, of which a greater part is recycled.

A new method of production has made its appearance in the Oklahoma City field in recent months. Its operation is based upon hydraulic principles. Fluid is pumped down a string of 1¼-inch tubing, causing a plunger to reciprocate. This plunger is directly connected to a second plunger, the suction of which opens to the well. Both cylinders discharge into the 2½-inch tubing leading to the well head. The 1¼-inch, or pressure tubing, is run inside the 2½-inch tubing and is packed off near the bottom of the hole with a ground joint fit. More fluid comes from the well than is pumped down the power tubing and represents the well's production. Filtered oil is used for power fluid, which is preheated to combat paraffin conditions, as well as to lower the fluid's viscosity. The surface power pump, filters, heater, gas separator and clock control switches are designed in a compact unit. Electric motors are used to drive the power pump and filter.

These hydraulic pumps are built in four sizes. The two-inch outer tubing has a capacity of 100 barrels per day; the 2½-inch, 200 barrels per day; the three-inch, 400 barrels per day; and the four-inch tubing, 800 barrels. Each size also requires a different power pump and motor. The power pumps are driven by a 7½ or 15-horsepower electric motor, and their selection depends upon the size of tubing used and probable well production.

Producing oil today from 6500-foot wells by mechanical methods with improved equipment has about the same elements of risk as when 4000-foot wells were produced by equipment then in use. Such achievements are possible, of course, because of the progressive spirit of those who work in and with the oil industry.

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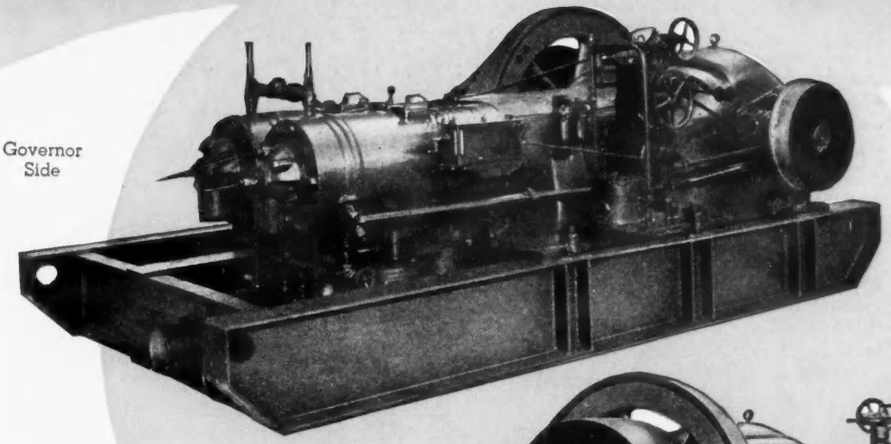
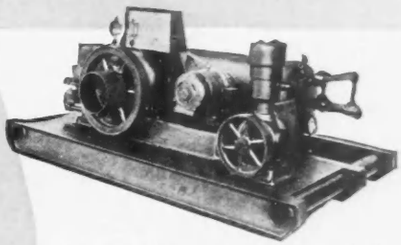


Governor Side



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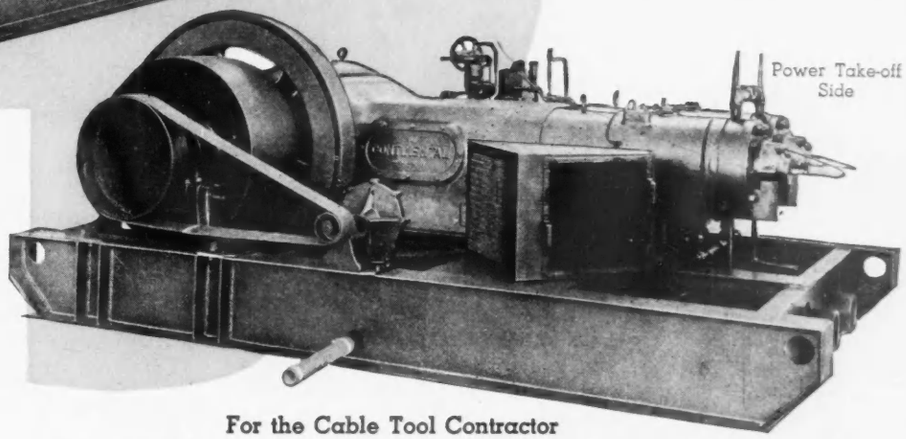

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CONTINENTAL

The Individual Pumping Unit and Its Engine Power

By J. S. MONTGOMERY
Phillips Petroleum Company
Bartlesville, Oklahoma

BEFORE THE ANNUAL MEETING OF THE MID-CONTINENT DISTRICT, AMERICAN PETROLEUM INSTITUTE, DIVISION OF PRODUCTION, FEBRUARY 20 AND 21, 1936, WICHITA, KANSAS.

TRENDS of surface pumping equipment in the Mid-Continent fields today are little or no different than they have been since the advent of pumping oil except for the improvement in design and efficiency of equipment. The principle has changed very little. This paper therefore deals with the transition that is taking place in the Mid-Continent field at this time.

The individual pumping unit embodies portability, salvageability, and low initial cost. With this type of equipment the question arises, "Will the unit type of pumping equipment withstand the test and be a permanent part of producing methods?"

The first and primary reason that the unit type of pumping equipment is becoming so popular is due to low initial investment and the high salvageability. It is generally conceived that this type of equipment is from 10 to 50 percent cheaper than the conventional rig front; however, it must be borne in mind that this may be accounted for in the fact that the usual unit type of equipment is used only to produce the reciprocating motion for pumping whereas the standard rig front is used for drilling, cleaning out, pulling and running rods and tubing in addition to producing the reciprocating motion for pumping. As a result of installing the unit type of pumping equipment, equipment must be provided to perform the duties of the standard rig front and the pumping unit must be considered as only a producing machine.

Pumping units may be classified in three groups of drives: Gears; Chains; Belts.

All of these types are giving good service in practically all cases; however, all of them have caused some degree of anxiety due to failure; principally caused by mis-application of the equipment. This may be caused to some degree by manufacturers being ambitious to show the producer a saving in a unit and as a result allow a unit to be installed which is not built to withstand the horsepower requirements of the well. The American Petroleum Institute has become active on this subject and at the November meeting in Los Angeles passed a tentative method of rating gears for pumping wells. No rating for V belts or chains in pumping units has been adopted by the A.P.I. committee to date.

The application and rating of pumping units depend to a large degree upon type of prime mover. Refer to Chart No. 1 which is taken from the A.P.I. specifications on the rating of gears for pumping units. Also refer to Chart No. 2 which will assist in visualizing the reason for these ratings. From this chart notice that the single cylinder four cycle engine shows one impulse of 13,000 foot pounds in .675 seconds, and the single cylinder two-cycle engine shows two impulses of 7000 foot pounds each or a total of 14,000 foot pounds in .675 seconds. The two-cylinder, two-cycle engine in this same period of time shows nine impulses of approximately 1000 foot pounds each. From this contrast it can be readily visualized that the use of a greater number of cylinders and a higher speed reduces the maximum impulses and tends to give a smoother flow of power. Unfortunately there are no curves for multi-cylinder four-cycle engines but it might be well to mention that a four-cylinder four-cycle engine might be expected to give 18 impulses of approximately 500 foot-pounds in .675 seconds and the six-cylinder four-cycle engine might be expected to give 27 impulses to approximately 330 foot-pounds each in the same time. Using Chart No. 1 it is found that a single-cylinder four-cycle engine running 200 revolutions per minute would impose 100 impulses per minute or give a factor .685. This means that the application of a single-cylinder four-cycle engine would reduce the rating of a mechanical drive in comparison to an electric motor 31.5 percent whereas a four-cylinder four-cycle engine running 800 revolutions per minute gives a factor of .97 or reduces the rating of the mechanical drive three percent. From this it is seen that the rating of the mechanical drive depends upon the requirements of the

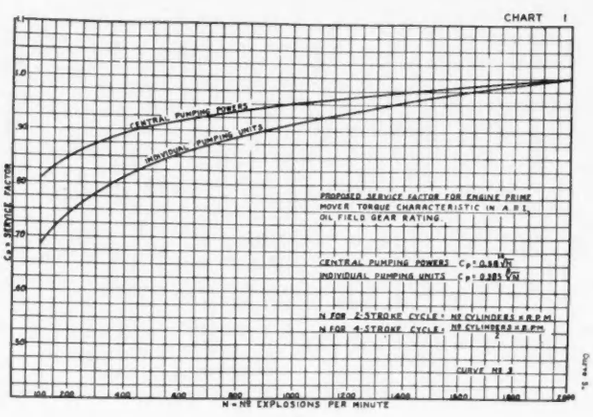
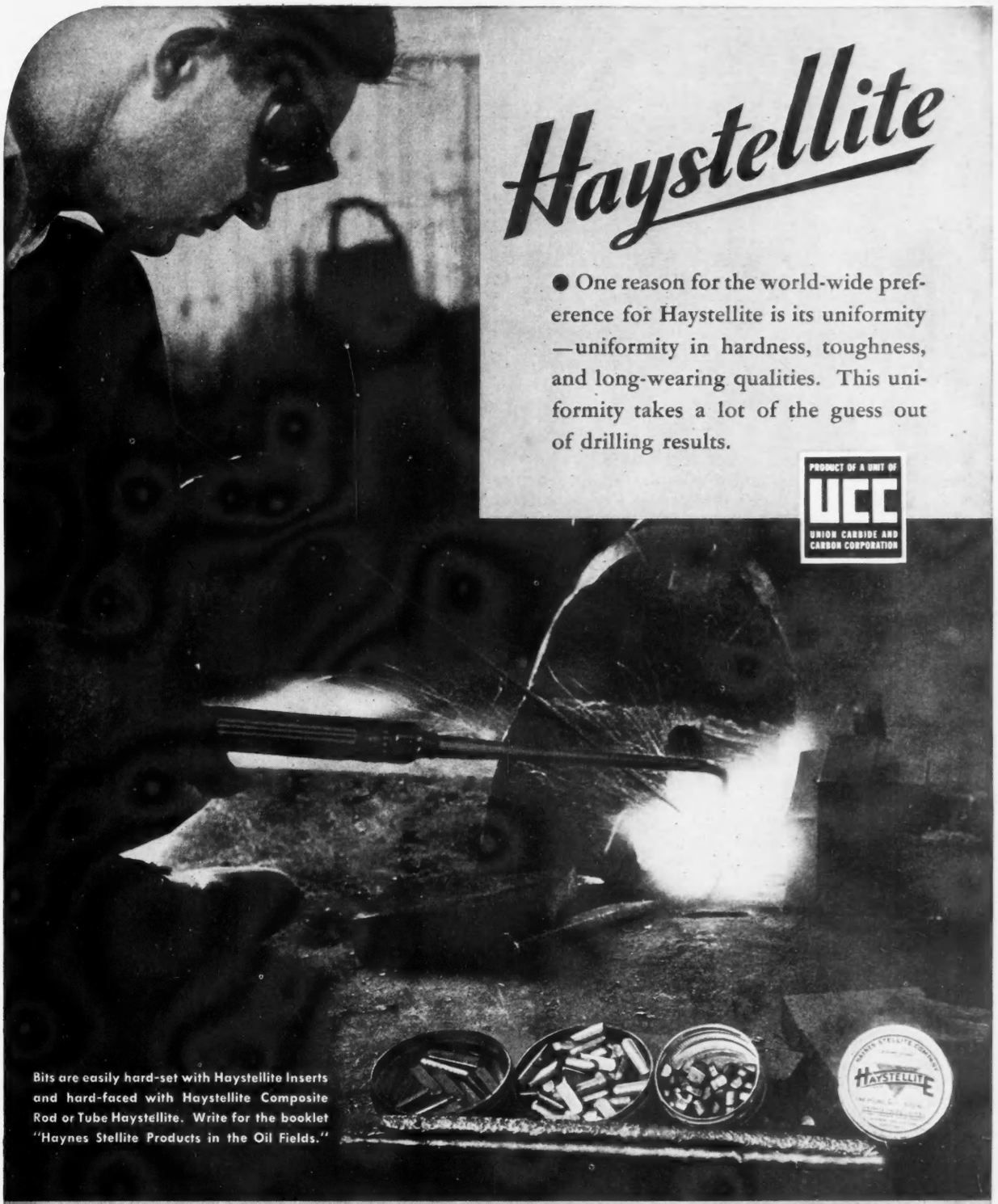


CHART 1
CENTRAL PUMPING POWERS
INDIVIDUAL PUMPING UNITS
PROPOSED SERVICE FACTOR FOR ENGINE PRIME MOVER TORQUE CHARACTERISTIC IN A.P.I. OIL FIELD GEAR RATING
CENTRAL PUMPING POWERS Cp = 0.68 √N
INDIVIDUAL PUMPING UNITS Cp = 0.385 √N
N FOR 2-STROKE CYCLE = NO CYLINDERS × R.P.M.
N FOR 4-STROKE CYCLE = NO CYLINDERS × R.P.M.
CURVE NO 2
Cp = SERVICE FACTOR
N = NO EXPLOSIONS PER MINUTE

CHART 1



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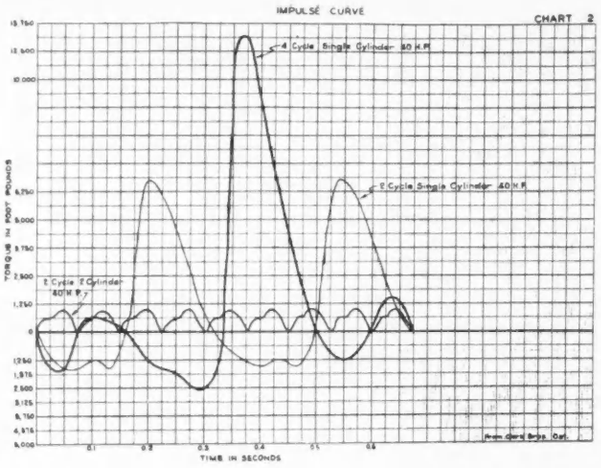
IMPULSE CURVE
CHART 2
4 Cycle Single Cylinder 80 H.P.
2 Cycle Single Cylinder 40 H.P.
2 Cycle 2 Cylinder 80 H.P.
TORQUE IN FOOT POUNDS
TIME IN SECONDS

CHART 2

well and of the prime mover to be used. From this comparison it is understood why multi-cylinder engines are applied to units. Looking again at low initial cost it is appreciated that a multi-cylinder engine costs approximately 50 to 75 percent as much as a single-cylinder engine of the same rating. It is, therefore, reasonable to expect a 25 percent reduction in the cost of a pumping unit with multi-cylinder engine over a pumping unit with single cylinder engine. Multi-cylinder engines also offer a flexibility of operation that is required in many cases due to having to take potentials at periodic intervals with the same equipment that is used in producing the well. It is desirous that the potential might be taken without changing any of the mechanical drive. In most cases this feature is possible with a multi-cylinder engine in that the operating speed can be varied 100 percent. In applying a high speed or a medium speed multi-cylinder engine to constant duty pumping service we immediately question the point of operating cost, maintenance and depreciation. The cost can be compared reasonably by comparing the relative piston speed of engines to determine piston wear and a study of bearing areas and speed to determine bearing wear. Chart No. 3 shows the relative horsepower, piston speed, and torque of four different types of engines. From this chart the following tabulation has been made for comparative purposes:

Type Engine	H.P.	R.P.M.	Piston Speed	Cu. in Piston Displacement
1-cylinder 2-cycle	40	250	580	1281
2-cylinder 2-cycle	40	280	430	794
4-cylinder 4-cycle	40	700	730	516
6-cylinder 4-cycle	40	660	560	500
1-cylinder 2-cycle	55	400	930	1281
2-cylinder 2-cycle	55	390	600	794
4-cylinder 4-cycle	55	900	940	516
6-cylinder 4-cycle	55	870	750	500

These figures show that the two-cylinder two-cycle engine has the lowest piston speed; however, this two-cycle engine has approximately 50 percent greater piston displacement than the multi-cylinder four-cycle engines. It might, therefore, be expected that the piston speed of the two-cylinder two-cycle engine would be nearly comparable under a comparable piston displacement, thereby necessitating the engine to run at a higher speed to develop the equivalent horsepower. It is understood that many engine manufacturers now agree that a piston speed of 1000 feet per minute is not considered excessive. Using piston speeds as a comparison, it can be seen that the two-cylinder two-cycle engine referred to above should require less servicing than any of the other engines.

In addition to the comparison of cylinder wear in these engines it must be remembered that the four-cycle engine requires attention to its valve mechanism and will require servicing at periodic intervals.

The majority of the multi-cylindered four-cycle engines sold for pumping purposes today have pressure lubrication to most bearings. This type of engine is often referred to as the automotive type of engine and in most cases is compared to the automotive type of engine in that a great many of the manufacturers apply these engines to truck and automobile service. Therefore, the liberty of citing engine temperatures has been taken (from "Oilness" Alox Chemical Corporation):

Piston crown	685°F.
Top piston ring	475°F.
Piston skirt	325°F.
Wrist pins	400°F.
Connecting rods	380°F.
Main bearings	350°F.
Crank case	310°F.

From these temperatures and from experience with lubricating oils in the high- and medium-speed engines, it can readily be appreciated that the oil in the crank case of these units remains at a temperature of approximately 300°F. This temperature is very detrimental to lubricating oil in that it increases its viscosity, produces a sludge and causes a varnish like gum which often causes piston rings to stick in their grooves and stick the piston in the cylinder. The proper water for cooling the water jackets of these engines is always provided, but no method of cooling the oil or bearings is taken into consideration, and as a result the complaint is often heard that natural gas in multi-cylinder engines causes the oil to thicken or increase in viscosity and in many cases the engine requires servicing due to improper lubrication rather than wear. Since this feature involves the operation of all engines it appears that some action should be taken to remedy this fault. One company is providing their engines with a sump pump using an oil heat exchanger and an oil reservoir to eliminate such difficulties. Two multi-cylinder engine manufacturers offer this oiling system on their engines at a moderate extra cost. By the use of this system the operator uses an SAE No. 20 oil until such time that the

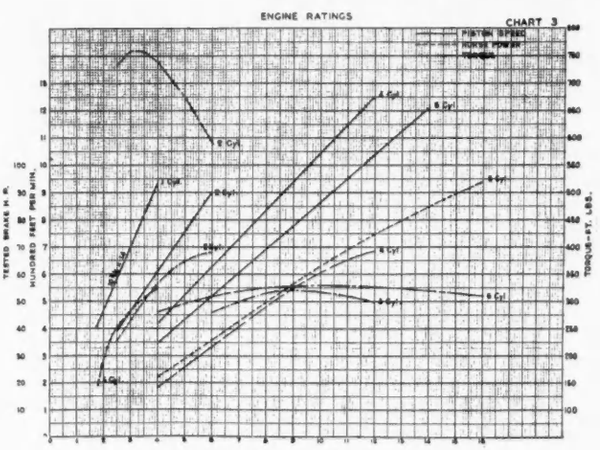

CHART 3

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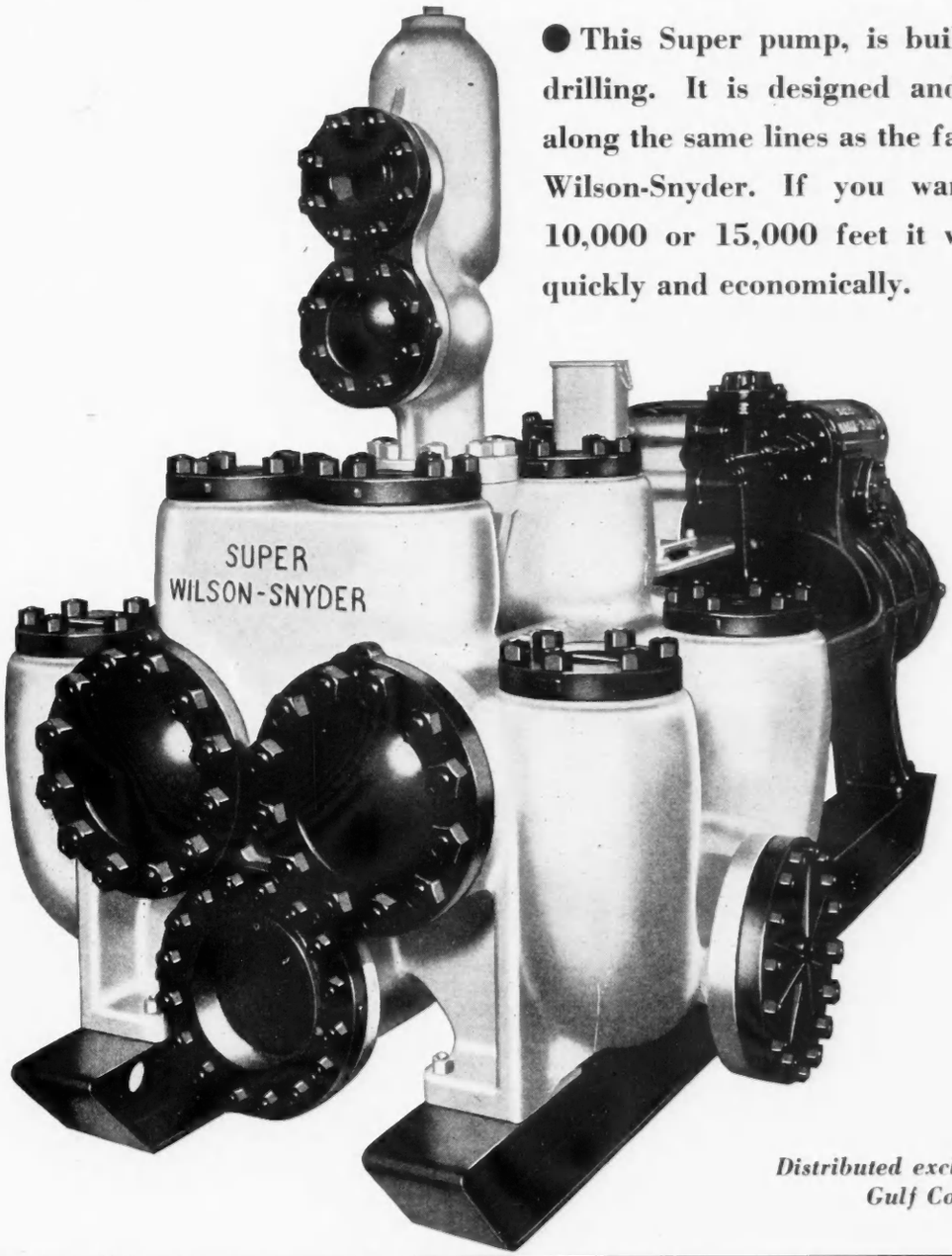

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engine oil consumption becomes excessive and then increases the viscosity to SAE No. 30. This allows the use of the same viscosity oil throughout the year and insures better lubrication in starting the engine during cold weather. Data on the service and oil consumption of this type of oil system versus the conventional crank case type is not available due to the comparative short period of time that it has been used. Chart No. 4 shows the application of this lubricating system.

Where engines depend upon pressure lubrication for their oiling, it is essential that they be protected against the failure of the oil pump which would cause the engine to burn out. This protection is provided by applying a pressure switch which becomes inoperative upon disengaging the engine clutch. In addition to protecting the engine against being operated without proper lubrication it also affords a moderate protection against an engine being operated with bearings so loose that oil pressure can not be maintained and thereby may save a repair bill due to loose bearings which often lead to broken connecting rods. Regardless of the type of oil system used in any engine every precaution should be used to see that an engine is provided with the proper grade and viscosity of oil and that the oil is changed at determined intervals to obtain the greatest service, and economy in their operation. It should be kept in mind that all engines are manufactured to a closer tolerance today than ever before. This requires a lubricant which will function at these closer tolerances.

The majority of medium-speed or high-speed engines in pumping service today are operated with radiators which are designed to cool the engines under the most extreme conditions, this design allows excessive cooling in moderate or cold weather and thereby allows a cold

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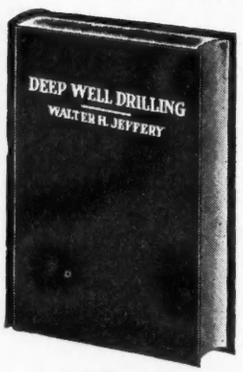

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CHART 4

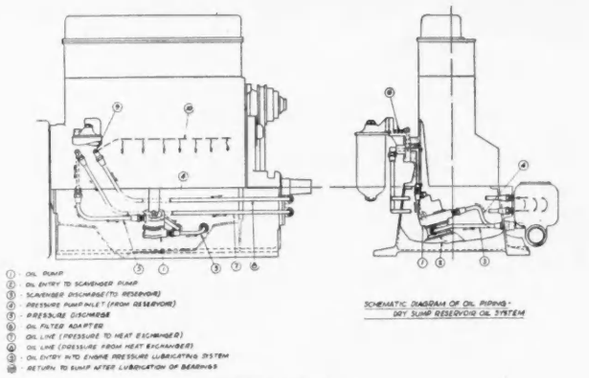

CHART 4

stream of water to be taken into the block of the engine and causes undue stress in the engine. With radiators this difficulty is solved by the application of thermostat and applying a cover to the lower portion of the engine in accordance to climatic temperatures. Where tanks are used a provision should be made to prevent cold water from entering the hot engine block by applying thermostat-controlled by-pass arrangement; the simplest method of applying thic control is to install a thermostat in a tee on the outlet of an engine which allows water to pass to the inlet of the engine when the temperature is not high enough to cause the thermostat to close.

In addition to providing proper water cooling conditions it is a simple matter to provide a high temperature water switch which causes the magneto to short when the engine is operated above a predetermined temperature. This precaution assures the operator that the engine will not be operated without the proper amount of cooling.

With the advent of the high- or medium-speed type of engine the application of an inclosed clutch with a shaft extending from this clutch without an out board bearing has been practiced. This application requires greater precaution in applying the pulley to the engine in order that this bearing or shaft does not have undue stress imposed upon it. The first precaution is that the engine pulley be carefully balanced to prevent vibration upon the engine; second, it is necessary that this pulley overhang the bearing as much as possible and it has been found that overhanging the bearing 50 percent allows an ideal condition. It is the tendency of many companies today to use a single reduction type of unit which requires the use of a very small engine pulley which will not leave any flexibility in reducing the pulley diameter should the operator desire to decrease the pumping speed. By using a larger pulley the stress imposed upon the clutch is decreased and therefore greater service from both the belts and the engine clutch bearings should be expected. Extremely small pulleys are very detrimental to belts. Larger pulleys allow a higher belt speed which provides greater horsepower output in the belt and in many cases provides a belt application more nearly suited to the horsepower requirements. Most units are of the two crank type which limit the width of the driven pulley on the unit. It is, therefore, imperative that the belt drive be checked as to speed to assure sufficient capacity to carry the load.

There is no doubt that the unit type of pumping equipment has become a permanent method of producing reciprocating motion for pumping oil wells; however, the proper application of these units must be considered in order to be assured of their success.

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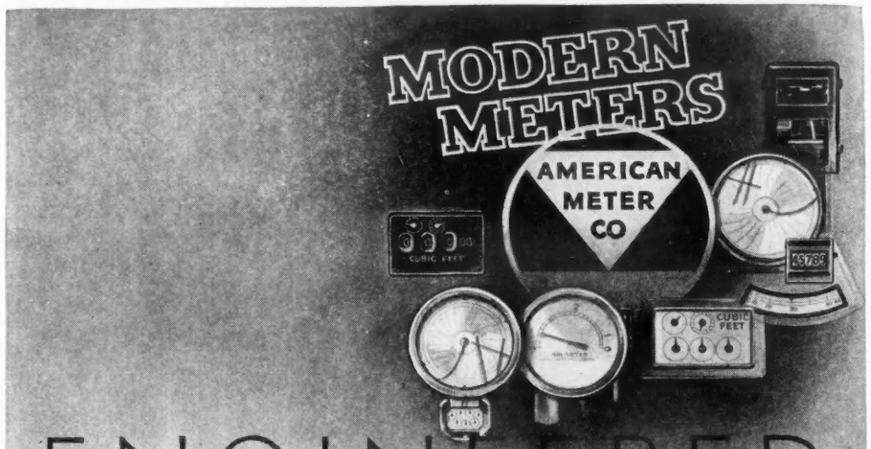

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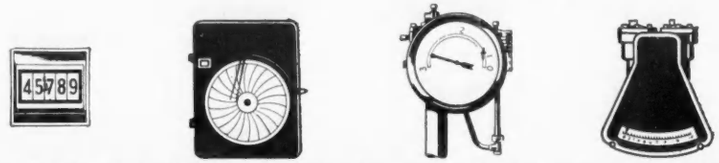

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Outlook Better

MARKETS APPEAR ON SOUNDER GROUND THAN IN PAST WEEKS

ALTHOUGH they have not recovered the firm position occupied just after the mid-January crude price increases, the markets apparently have regained a sounder footing. Conditions are looking better for the Pacific Coast region as well as for the rest of the country.

Largely because of the long siege of cold weather, the gasoline market has been unsteady for several weeks east of the Rockies. Surplus gasoline that accumulated at refineries during the period has been selling at prices under those that prevailed just after the crude price advances. But in the meantime, major companies have been supporting the higher prices on their regular purchases.

Late last week the weather already had moderated some in the Middle West, the Southwest, and the Southeast, and generally better weather conditions for the whole country were hoped for. The expected better motoring conditions likely will be followed by a narrowing of the above mentioned price range that has been prevailing on gasoline in the past few weeks.

East Texas Steady

The major companies have continued to pay 5⅛ cents a gallon for the low octane gasoline bought regularly in East Texas through the buying pool, such purchases aggregating about 200 tank cars per week. But in the past few weeks distress material has been accumulating, despite that regular major company buying; and in the effort to prevent a general price break, the larger concerns have supplemented their regular buying with direct purchases of the distress material. Such surplus gasoline has been taken usually at about 4¾ cents a gallon. Thus there has been actually a range of prices from 4¾ to 5⅛ cents per gallon on the East Texas third grade gasoline, below 62 octane. These prices refer to legal material, supported by federal tenders and therefore eligible for interstate shipment.

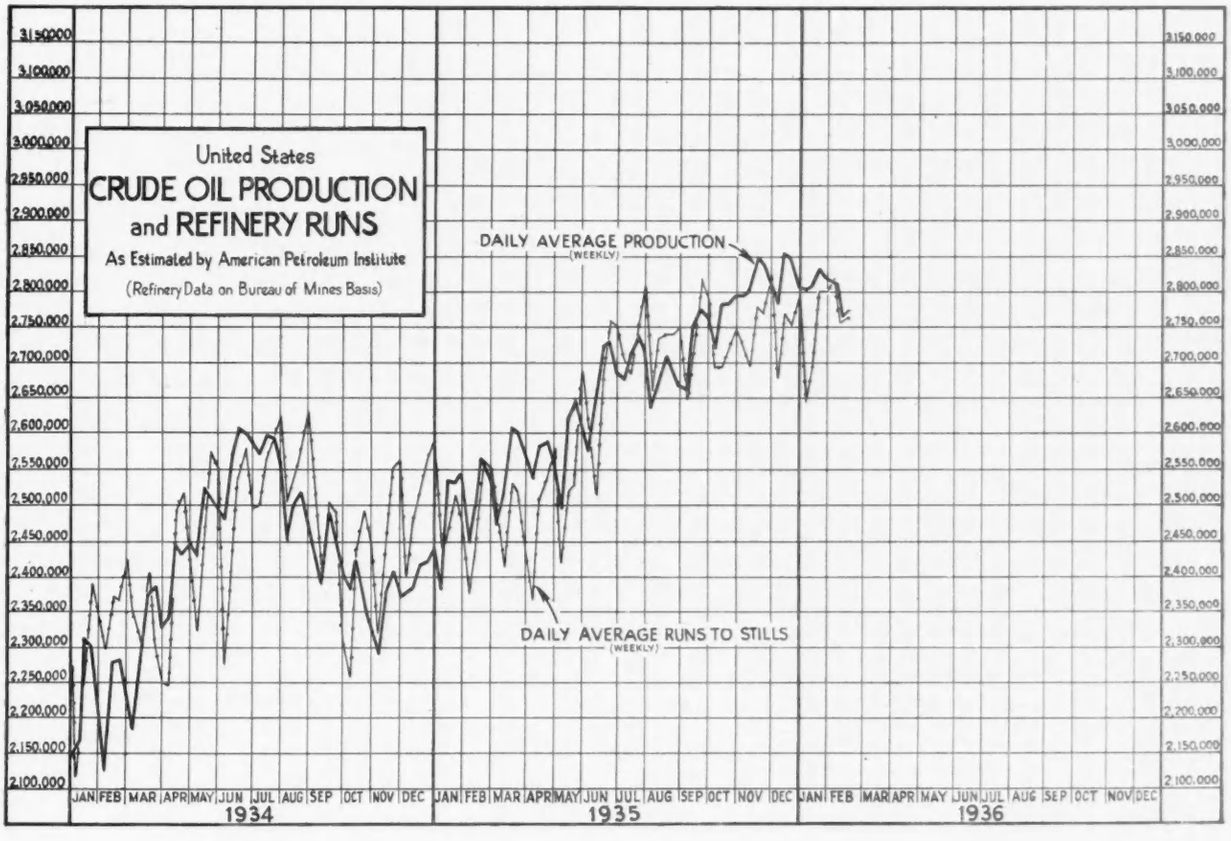
In the meantime, gasoline moving from East Texas in trucks, largely to Texas points, has been quoted at 4½ to 5 cents a gallon.

Hot oil production in East Texas currently is estimated at about 14,000 barrels daily, including approximately 3000 barrels daily of confiscated material being processed by the refineries.

During the past week the major companies purchased about 325 tank cars of gasoline in East Texas, or about 125 cars in addition to the 200 cars regularly bought through the buying pool. These 325 cars represented somewhat more than one half of the total shipments from the district during the week. Consequently, there was a comparatively large proportion of the week's shipments consigned to coastwise and export points.

Oklahoma Prices Same

In the northern portion of the Mid-Continent, also, gasoline tank car prices remained the same during the past week, despite some discouragement over the continued cold weather and low consumption. The adverse weather caused increases of stocks at refineries in Oklahoma and Kansas, as well as in East Texas. For Oklahoma, Kansas, and Missouri, total stocks of finished



gasoline are approximately 1,500,000 barrels higher than at this time last year. In the Illinois, Indiana, Kentucky area, similarly, the stocks are about 500,000 barrels higher.

In the Oklahoma-Kansas territory last week there was some fear that some of the smaller refineries, with storage filled and needing cash, might soon resort to lowering prices to move their gasoline, if the weather and demand did not immediately improve. In the Chicago territory brokers loaded up, in some instances, in the few days between the January crude price increases and the subsequent gasoline price advance, and still have much of that material on hand since bad weather immediately followed the price increases. Those brokers consequently are out of the buying market for a while.

Late last week the low octane U. S. motor gasoline, below 62, continued to be priced at 5¼ cents per gallon in the Oklahoma market as well as in North Texas. The 63-70 octane gasoline meanwhile was priced at 6⅛ to 6¼ cents in Oklahoma, and at 6⅛ cents in North Texas. These prices have been in effect since the advances of mid-January.

Excessive Drilling Feared

From a long range standpoint, there is some fear that the recent 10-cent increase in crude prices will cause a 10 percent increase in drilling, and that more new fields consequently will be opened. Every section of the country appears headed for a big drilling campaign, and the results are encouraging. It is believed, therefore, that the industry may be running into an over-production era. At the same time, it is conceded that some of the new discoveries are being held back for reserves, and will continue to be. Yet such strikes as the Rodessa area probably will be developed immediately.

In connection with prospective increased drilling, it may be pointed out, however, that demand for petroleum will be substantially higher in 1936 than in 1935. And the demand was near all-time peak proportions even in 1935.

East Texas Tank Car Shipments

Week Ending February 16, 1936

PRODUCTS—	No. Cars	Estimated Gallons
Gasoline	624	5,082,026
Fuel Oil	193	1,895,505
Casinghead Gasoline	172	1,446,954
Distillate	62	498,278
Gas Oil	28	228,304
Kerosene	17	134,079
Naphtha	5	36,366
Residuum	3	24,346
Topped Crude	2	19,879
Total	1,106	9,365,737
Total previous week	1,092	9,278,480
Coastwise	486	.....
Interstate	313	.....
Intrastate	307	.....
Total	1,106	.....

Gasoline Inventories Reasonable

Although the recent weeks of bad weather have caused piling up of gasoline stocks at some refineries, the total storage in the United States is regarded by some as being not particularly excessive or alarming. The total inventories of finished gasoline (at refineries, bulk terminals, in transit, and in pipe lines), as reported to the American Petroleum Institute, aggregated 56,879,000 barrels on February 15, 1936. That amount was 4,463,000 barrels, or 8.5 percent, greater than the stocks held one year previously. However, such an increase appears more or less warranted. For the American Petroleum Institute has estimated that gasoline demand will be 8.1 percent greater for the first quarter of 1936 than for that period in 1935.

California Situation Improved

The market outlook in California has been materially improved through the reduction in crude oil production achieved during the past three weeks. Through the voluntary proration program, the state's output has been reduced about 100,000 barrels under the daily averages that prevailed in January and February. Last week the state averaged 573,500 barrels per day.

The California producers have as their goal a reduction to 537,000 barrels per day, as major purchasers have volunteered to raise crude prices about 20 cents a barrel if crude production is curtailed to such an extent. Thus the actual production of last week still was 36,500 barrels per day higher than the desired level. And it was becoming increasingly difficult to reduce the output further. Last week's production was only about 11,000 barrels a day lower than that of the previous week; whereas the two earlier weeks each had brought decreases of around 50,000 barrels.

In view of the determined efforts that have been made to reach the fixed goal, and the favorable results already achieved, there is some hope among the California producers that the crude prices soon will be increased, at least to some extent, even if the operators are not successful in bringing production down all the way to the desired level.

The gasoline market has continued unsteady in Southern California, as there is substantial excess material on hand. However, the reduced crude production naturally is tending to strengthen the gasoline market.

KITTRELL ORDER

Austin, Texas — Operators in the Trinity or Kittrell field in Houston County will no longer be permitted to produce more oil than is provided in the proration schedule.

This provision was contained in an order of the Railroad Commission issued last week and prohibits the practice formerly allowed of supplying fuel oil to railroads. Operators will not be permitted to supply such oil to other local fuel markets unless it is charged against their allowables.

Summary of Wells Completed in the United States

Week Ending February 22, 1936

	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total Completions 1936	Total Completions this date 1935
Alabama	....	....	....	....	.....	....	1
Arkansas	....	....	....	....	.....	9	35
California	11	8	1	2	9,650	116	98
Colorado	....	....	....	....	.....	....	2
Illinois	....	....	....	....	.....	....	4
Indiana	....	....	....	....	.....	23	30
Kansas	20	12	2	6	5,739	148	192
Kentucky	9	3	2	4	72	9	16
Louisiana	24	17	3	4	165,733	103	105
Michigan	11	4	4	3	105	98	50
Mississippi	....	....	....	....	.....	....	5
Montana	2	....	2	....	.....	15	8
New Mexico	12	10	1	1	9,394	50	39
New York	....	....	....	....	.....	....	....
Ohio	67	21	32	14	288	249	248
Oklahoma	41	29	4	8	24,548	333	318
Pennsylvania	....	....	....	....	.....	....	23
Texas	167	141	7	19	241,753	1,334	1,579
Utah	....	....	....	....	.....	....	....
West Virginia	24	6	12	6	132	104	84
Wyoming	....	....	....	....	.....	5	1
Total this week	388	251	70	67	457,409	2,574	2,481
Total last week	308	217	30	61	261,194	....	....
Total this year	2,574	1,712	289	573	2,785,291	....	....

Comparison of Permits Granted for New Wells

STATE	Week Ending Feb. 22	Total this Mo.	Total this Year	Total this Date Last Year	1935 Year Total
Arkansas	1	5	14	31	70
California	10	46	86	111	925
Louisiana	22	86	157	112	846
Kansas	39	101	218	226	1,204
Michigan	7	32	88	62	749
Oklahoma	56	147	339	306	2,311
Texas	393	853	1,607	1,993	10,800
Total	528	1,270	2,459	2,841	16,964

PRODUCTION DROPS

Decrease for California features fluctuations

LAST week brought an encouraging crude production situation, since the nation's output was 33,075 barrels per day lower than in the previous week, and since California showed a further decrease, in response to the earnest curtailment efforts of the operators in that state.

For the new week, that is, the period ended February 22, the United States production averaged 2,775,050 barrels per day.

Although that figure was 126,950 barrels a day more than the Bureau of Mines recommendation for average daily production in February, this excess compares favorably with the overproduction of some past weeks.

California Output Lower

For California alone, production last week was about 100,000 barrels per day lower than the daily averages maintained in December and January. California's output last week averaged 573,500 barrels per day, or 11,500 barrels a day less than in the previous week.

The California producers, co-operating in a voluntary curtailment program, are endeavoring to bring the state's production down to 537,000 barrels per day. Last week's average was within 36,500 barrels of that goal, but the decrease for the period was smaller than in each of the two previous weeks, when declines of about 50,000 barrels were effected. A major company has promised to increase California crude prices about 20 cents a barrel if and when the state's output is reduced to 537,000 barrels daily. Since it is becoming doubtful, however, if the curtailment can be carried that far, there is hope that at least some raising of the prices may occur as reward for the reduction that has been achieved. The 537,000-barrel goal is a little higher than the Bureau of Mines estimate of demand for February, which was 529,600 barrels daily.

Other States Fluctuate

Texas last week produced in fair conformity with the recommendation of the Bureau of Mines, averaging 1,076,600 barrels per day, or about 8000 barrels per day more than the federal allocation of demand. In the previous week the Texas output averaged 1,101,300 barrels daily.

Oklahoma production was practically unchanged from the previous week, averaging 523,800 barrels daily, compared with 524,775 barrels per day before. In both weeks the output was about 50,000 barrels a day above the Bureau of Mines allocation. But it is customary for Oklahoma to produce above the allocation in the fore part of each month, and then to compensate by under-producing.

Kansas production increased to 141,600 barrels daily last week from 135,925 barrels per day the previous week, and consequently was about 4000 barrels a day higher than the federal allocation in the new period.

United States Crude Oil Production

Estimates Compiled by THE OIL WEEKLY

DISTRICT OR STATE	BARRELS DAILY FOR WEEK ENDING February 22	February 15
TEXAS—		
Texas Panhandle	58,400	58,200
North Texas	56,800	57,500
West Central Texas	25,600	26,200
West Texas	160,400	160,300
East Central Texas	50,200	51,200
*East Texas Field	435,800	440,300
†South Texas	71,100	77,200
†Texas Gulf Coast	218,300	230,400
*Total Texas	1,076,600	1,101,300
OKLAHOMA—		
Oklahoma City	150,625	153,125
Seminole Area	125,900	122,225
Tatums	3,600	3,750
Lucien	10,250	10,500
Fitts	42,750	42,375
Edmond	9,475	10,100
Others	181,200	182,700
Total Oklahoma	523,800	524,775
KANSAS—		
Ritz-Canton	6,205	6,475
Voshell	4,075	3,400
Nikkel-Hollow	3,975	4,375
Sedgwick	5,675	5,800
Oxford	8,000	7,600
Burrton-Haury	13,425	12,950
Lorraine	8,925	6,925
Others	91,500	88,400
Total Kansas	141,600	135,925
LOUISIANA—		
North Louisiana	55,900	57,900
Louisiana Gulf Coast	133,200	133,100
Total Louisiana	189,100	191,000
ARKANSAS	29,450	29,425
CALIFORNIA—		
Long Beach	70,000	72,000
Santa Fe Springs	43,500	43,500
Huntington Beach	38,000	37,500
Dominguez	31,000	30,500
Inglewood	12,500	12,000
Ventura Avenue	33,500	33,500
Seal Beach	7,500	7,500
Midway-Sunset	48,500	49,000
Elwood	12,500	12,500
Kettleman Hills	75,500	80,000
Mountain View	28,000	29,500
Playa del Rey	13,500	14,000
Others	159,500	163,500
Total California	573,500	585,000
MOUNTAIN STATES—		
Wyoming	32,200	33,800
Montana	13,100	13,700
Colorado	3,800	3,900
Total Rocky Mountain States	49,100	51,400
NEW MEXICO	57,200	57,800
EASTERN STATES	98,600	97,200
MICHIGAN	36,100	34,300
*Total United States	2,775,050	2,808,125
*Surreptitiously produced oil in East Texas, not included in above figures, estimated at	10,000	8,000
Grand Total, including surreptitious production	2,785,050	2,816,125

†Coastal District of South Texas is included with Texas Gulf Coast.

Crude Runs to Stills; Stocks of Finished and Unfinished Gasoline and Gas and Fuel Oil, and Cracked Gasoline Production, Week Ended February 15, 1936

(Figures in thousands of barrels of 42 gallons each, reported by American Petroleum Institute)

DISTRICT	Daily Refining Capacity			Crude Runs to Stills		Stocks of Finished and Unfinished Gasoline				Stocks of Gas and Fuel Oil			Daily Charging Capacity of Cracking Units			Cracked Gasoline Production
		Reporting				Finished								Reporting		
	Potential Rate	Total	%	Daily Average	% Operated	At Refineries	Terms. Trans. Pipe Lines	Unfinished in Naphtha Distillates	Total Finished and Unfinished	Gas Oil & Distillate	Residual Fuel Oil	Total	Potential Rate	Total	%	Daily Average
East Coast	612	612	100.0	511	83.5	5,844	9,459	920	16,223	2,276	3,334	5,610	534	534	100.0	105
Appalachian	154	146	94.8	93	63.7	1,484	974	273	2,731	463	212	675	79	78	98.7	18
Ind., Ill., Ky	442	424	95.9	357	84.2	6,355	3,319	844	10,518	893	1,510	2,403	349	348	99.7	101
Okla., Kans., Mo	453	384	84.8	259	67.4	4,357	2,305	629	7,291	743	2,081	2,824	256	228	89.1	57
Inland Texas	330	160	48.5	99	61.9	1,243	99	216	1,558	243	1,225	1,468	148	105	70.9	28
Texas Gulf	680	658	96.8	543	82.5	6,554	242	1,662	8,458	3,183	4,796	7,979	399	393	98.5	121
Louisiana Gulf	169	163	96.4	121	74.2	1,100	408	233	1,741	850	2,084	2,934	77	74	96.1	25
North La.,—Ark.	80	72	90.0	43	59.7	229	70	84	383	77	460	537	46	44	95.7	8
Rocky Mountain	97	60	61.9	50	83.3	1,210	.....	97	1,307	152	532	684	46	39	84.8	11
California	852	789	92.6	492	62.4	9,317	2,310	1,316	12,943	.....	.....	70,179	280	280	100.0	63
Reported	.....	3,468	89.6	2,568	74.0	37,693	19,186	6,274	63,153	.....	.....	95,293	.....	2,123	95.9	537
Estimated Unreported	.....	401	....	197	....	2,894	815	603	4,312	.....	.....	1,258	.....	91	....	33
*Estimated Total U.S. Feburary 15, 1936	3,869	3,869	....	2,765	....	40,587	20,001	6,877	67,465	.....	.....	96,551	2,214	2,214	....	570
*Estimated Total U.S. February 8, 1936	3,869	3,869	....	2,760	....	38,793	19,212	6,733	64,738	.....	.....	99,231	2,214	2,214	....	550
U.S.B. of M. Feb. 1935	.....	....	....	2,529	....	†38,548	†20,391	†5,949	†64,888	.....	.....	†101,085	.....	....	....	537

*Bureau of Mines basis currently estimated. †As of February 28, 1935. On March 31, 1935, total stocks Finished and Unfinished Gasoline were 66,290,000 bbls.

NOT ENCOURAGING

California cannot reach crude curtailment goal

Los Angeles.—The outlook for California to reduce its daily average production of crude oil to 537,000 barrels, supposed to represent actual demand, is not any too encouraging, as this is being written. But producers have done a fairly good job, comparatively speaking, in that they have reduced daily production to an average of close to 570,000 barrels, which compares to a monthly A.P.I. average of 678,284 barrels a day in December, 1935. And this also compares to a low of 472,471 barrels a day in April, 1935, and 600,136 barrels a day in August, 1935.

On February 15, production was down to 571,954 barrels, according to figures from the state umpire's office. The production February 16 was 567,503 barrels, but jumped to 574,113 barrels February 17. The feeling is prevalent that it is impossible under voluntary action to reduce daily production to 537,000 barrels, in spite of the offer to raise the posted price to a point that will at least take care for the loss incident to reducing output.

Using figures as of February 17, it is noted that the production in the San Joaquin Valley fields shows an overage of 7960 barrels. In the Coastal area, production is 4227 barrels over the new allowable set. But in Los Angeles Basin fields, the overage jumps to 24,926 barrels. This simply means the most prominent light oil fields in the Basin are refusing to play the game. The offending fields include Dominguez, 8323 barrels over, and this is largely a large-company field. Huntington Beach, a small operator field, is producing 4409 barrels too much oil. Inglewood, another large-company field, shows an overage of 1550 barrels. Long Beach, with most of the production in the hands of smaller companies, is producing 7080 barrels too much. Playa del Rey, mostly independent, is 1300 barrels over. Santa Fe Springs, a town lot field, with lots of independent operators, is showing an overage of about 1876 barrels a day. This means that on February 17, the state was producing exactly 37,113 barrels more than the figure of 537,000 barrels, which had been set as the level to secure a higher posted price.

The daily average production of crude oil in California in 1935 was 569,403 barrels, and during that year, the total stock increase was 4,410,329 barrels. These figures are from the annual report compiled by the American Petroleum Institute. The actual demand in 1935 showed a nice increase over 1934. Most of the increase was fuel oil, which moved in large volume in 1934 in tankers. Such movement showed a marked decline late in 1935.

Major companies are showing a net of close to three cents for third grade gasoline sold in the general Los Angeles, or Southern California, area. It is understood the net on ordinary grades of gasoline moving to points outside of the Southern California area, is nearer 3.5 to 4 cents. Smaller or independent refiners in Southern California are realizing slightly less. Also, the smaller refiners are running too much crude through their plants and as a result there is close to 20,000,000 gallons of distress independent gasoline in Southern California, which is a big threat hanging over the general market.

The local or state market for fuel oil is in fair condition. A good product is finding a market at around 65 cents and the low grade product is selling at 50 to 55 cents. The tanker rate of 82 to 85 cents on all products from California to East Coast places a damper on much off shore movements unless on long time contracts.

Also, much has been said about lack of storage facilities in California. It should be remembered that much of the California storage has been in past years represented in heavy crude oil and fuel oil, which can be stored in reservoirs.

BURNING OILS STRONG

Tulsa.—Prices remained unchanged in the Mid-Continent, Group 3, Oklahoma market, the past week, as burning oils continued to lead the pace under heavy demand, which threatened to exceed the supply. There was but little spot trading, but contract shipments were about normal.

Continued bad weather prevented or greatly handicapped all forms of transportation throughout most of the northern Mississippi Valley and as far south as Kansas and Oklahoma. It was reported that refineries were doing a nice job in holding motor fuel stocks down, in the face of attempts to step up burning oil production.

CRUDE OIL PRICE QUOTATIONS

(Figures Represent Basic or Flat Prices—Revised to February 21, 1936)

DISTRICT	Low Grav.	Dif.	High Grav.	Date
Oklahoma-Kansas	28—$0.94	2¢	40—$1.18	1- 9-36
N. and N.-C. Texas	23— .84	2¢	40— 1.08	1- 9-36
Texas Panhandle				
Gray County	34— .86	2¢	40— .98	1- 9-36
Carson-Hutchinson	34— .81	2¢	40— .93	1- 9-36
West Texas				
Ector, Pecos, W'kler, Crane, Upton, Howard and Glasscock	29— .76	2¢	36— .90	1-14-36
West Central Texas	28— .84	2¢	40— 1.08	1- 9-36
East Central Texas	28— .91	2¢	40— 1.15	1- 9-36
East Texas	*1.15			1- 9-36
Texas Gulf Coast				
Anahuac-Dickinson	30— 1.04	2¢	40— 1.24	1- 9-36
Conroe	35— 1.24	2¢	40— 1.34	1- 9-36
Tomball	*1.30			1- 9-36
Cleveland	*1.00			1-11-34
†Goose Creek, Hull Liberty, Orange, Pierce Junction, Moss Bluff, Raccoon Bend, Sour Lake, Spindletop, Sugarland, West Columbia, Humble, Rabbs Ridge	Below 17— .88	2¢	34— 1.22	1- 9-36
South and S. W. Texas	Below			
Refugio (Light)	17— .88	2¢	34— 1.22	1- 9-36
Refugio (Heavy)	*.90			1- 9-36
Saxet	*.90			1- 9-36
Mirando	*.85			1- 9-36
Pettus	*1.25			1- 9-36
Salt Flat	*.97			1-14-36
Darst Creek	*.97			1-14-36
Port Lavaca	*.97			
Plymouth	*.90			12-17-35
Arkansas				
El Dorado (Light) and Rainbow	25— .78	2¢	40— 1.10	1-10-36
El Dorado East Field and Smackover	*.75			1-10-36

* All gravities—flat rate.
† Gulf Coast prices as posted by Humble Oil & Refining Company.

DISTRICT	Low Grav.	Dif.	High Grav.	Date
North Louisiana	25—$0.78	2¢	40—$1.10	1-10-36
Uranis	*.97			1-10-36
South Louisiana	Below			
Lockport	19— .92	2¢	34— 1.22	1- 9-36
	Below			
Iowa, Cameron Mds.	19— .82	2¢	34— 1.12	1- 9-36
Rocky Mountain States				
Salt Creek	20— .94	2¢	40— 1.18	1-10-36
Elk Basin	*1.28			1- 9-36
Grass Creek (Light)	*1.28			1- 9-36
Grass Creek (Heavy)	.58			1- 9-36
Big Muddy	*1.11			1- 9-36
Rock Creek	*1.12			1- 9-36
Sunburst	*1.25			1- 9-36
Lance Creek	*.90			1- 9-36
Osage	*1.08			‡
Cat Creek	*1.07			8-25-33
Cut Bank	*1.45			9-29-33
Ponders	*1.05			9-29-33
Hog Back, N. M.	*1.00			9- 8-33
Lea County, N. M.	*.75			9-29-33
Mid-West States				
Lima	*1.25			1-10-36
Illinois	*1.23			1- 9-36
Princeton	*1.23			1- 9-39
Western Kentucky	*1.23			1- 9-36
Pennsylvania				
Bradford	*2.45			1-13-36
Sw. Pa. Pipe Line	*2.17			1-13-36
Eureka Pipe Line	*2.12			1-13-36
Buckeye Pipe Line	*1.97			1-13-36
Corning Grade	*1.42			1-13-36
Michigan				
Central Michigan	*1.12			11- 7-35
Muskegon	*.70-1.00			12-31-32
Canada				
Petrolia	*2.10			9- 9-33
Oil Springs	*2.17			9- 9-33

* All gravities—flat rate.
‡ Average price, all oil sales being to small refineries.

MAJOR PRICE CHANGES

	Penna. (Nat. Tr.)	Mid.-Cont. (36 Gr.)	Calif. (26 Gr.)
May 22, 1933	Up 10	.....	.....
June 19, 1933	Up 10	Up 10	.....
June 26, 1933	Up 10	.....	Up 9-12
July 6, 1933	Up 13	Up 10	.....
July 17, 1933	Up 15	.....	.....
July 28, 1933	Up 15	.....	.....
August 11, 1933	Up 10	.....	.....
August 24, 1933	.....	Up 10	.....
August 30, 1933	Up 15	.....	.....
September 6, 1933	Up 10	Up 10	Up 15
September 8, 1933	.....	Up 15	.....
May 1, 1934	Up 10	.....	.....
November 6, 1934	Cut 25	.....	.....
December 6, 1934	Cut 25	.....	.....
January 4, 1935	Up 15	.....	.....
February 4, 1935	Up 15	.....	.....
May 16, 1935	Cut 15	.....	.....
June 26, 1935	Cut 15	.....	.....
July 16, 1935	Cut 10	.....	.....
August 29, 1935	.....	.....	Cut °46
September 6, 1935	Up 5	.....	.....
October 29, 1935	Up 15	.....	.....
November 1, 1935	.....	.....	Up °28
November 18, 1935	Up 15	.....	.....
December 6, 1935	.....	.....	Up °9
January 9, 1936	.....	Up 10	.....
January 13, 1936	Up 15	.....	.....

CRUDE PRODUCTION TAXES

Oklahoma—Five percent of gross value less royalty interest.

Texas—Two cents or 2 percent, whichever is higher.

Louisiana—From four to 11 cents a barrel, depending upon gravity.

Arkansas—2.6 percent of gross market values.

Montana—Two percent of gross value at well and ⅓ of 1c per barrel.

Wyoming and New Mexico—Production tax based upon state and county assessments.

California—.66443 mills per barrel of oil produced and 17.39 cents per acre on proved oil lands.

* All gravities—flat rate.
° Signal Hill 26 gravity.

CALIFORNIA OIL PRICES

(All gravities above those quoted take highest prices of that field Effective December 6, 1935)

Gravity	Signal Hill	Seal Beach Alamitos Heights	Huntington Beach	Inglewood	Playa Del Rey	Olinda Brea Canyon	Athens Rose-Dominguez	Elwood Terrace	Torrance	Richfield	Whittier La Habra	Montebello	Coyote Hills	Santa Fe Springs	Newhall McKittrick Kern River Round Mountain	Mountain View	Midway Sunset Elk Hills Buena Vista Hills	Lost Hills	Coalinga	Wheeler Ridge
14-18.9	$.75	$.74	$.73	$.74	$.75	$.71	....	....	$.75	$.71	$.71	$.72	$.73	....	$.65	...	$.65	$.65	$.65	....
19-19.9	.75	.74	.74	.77	.76	.75	....	....	.77	.71	.71	.72	.73	....	.65	$.65	.66	.68	.66	.65
20-20.9	.76	.74	.76	.79	.79	.77	....	....	.78	.71	.73	.72	.73	....	....	.65	.68	.71	.67	.65
21-21.9	.78	.74	.78	.81	.81	.79	....	....	.80	.71	.75	.72	.75	$.73	....	.65	.71	.73	.69	.65
22-22.9	.80	.74	.80	.82	.84	.81	....	....	.81	.73	.77	.72	.77	.73	....	.66	.74	.75	.71	.67
23-23.9	.82	.77	.82	.84	.86	.83	$.79	....	.83	.75	.79	.74	.79	.73	....	.67	.77	.77	.73	.69
24-24.9	.84	.80	.84	.86	.88	.84	.81	F.O.B. Ship	.84	.77	.80	.76	.81	.75	....	.69	.80	.80	.75	.71
25-25.9	.86	.82	.86	.87	.91	.86	.83		.86	.79	....	.78	.82	.77	....	.71	.83	.82	.77	.73
26-26.9	.88	.85	.88	.89	.93	.88	.86		.88	.81	...	.80	.84	.79	....	.73	.86	.85	....	...
27-27.9	.90	.88	.90	.91	...	.90	.88		...	.83	...	.82	.86	.82	....	.76	.88	.88	....	...
28-28.9	.92	.90	.91	.92	...	.92	.90		...	.85	....	.83	.88	.84	....	.78	.91	.90	....	...
29-29.9	.94	.93	.93	.94		....	.93		...	.87	....	.85	.90	.86	....	.80	.94	.92	....	...
30-30.9	.96	.95	.95	.95		....	.95		...	...	....	.87	.92	.89	....	.83	.97	.94	....	...
31-31.9	...	....	...	.97		....	.97		Kettleman Hills			.89	.94	.91	....	.85	.99	...	....	...
32-32.9	...	....	...	.99		....	1.00	....				.91	.96	.93	....	.87	1.02	...	....	...
33-33.9	...	....	...	...	F. O. B. Pipe Line	....	....	$.99	$.95			.93	.98	.95	....	.89	1.04	...	....	...
34-34.9	...	....	...	...		....	....	1.01	...	.97	....	.95	1.00	.98	....	.91	....	....	....	....
35-35.9	...	....	...	...		....	....	1.03	...	.99	....	.97	...	1.00	....	....	....	....	....	....
36-36.9	...	....	...	...		....	....	1.05	...	1.02	....	.99	...	1.02	....	....	....	....	....	....
37-37.9	...	....	...	...		....	....	1.07	...	1.05	....	1.00	...	1.04	....	....	....	....	....	....
38-38.9	...	....	...	...		....	....	....	...	1.08	....	1.03	...	1.07	....	....	....	....	....	....
39-39.9	...	....	...	...		....	....	....	...	1.11	....	1.05	...	....	....	....	....	....	....	....
40-40.9	...	....	...	...		....	....	....	...	....	....	1.07	..	....	....	....	....	....	....	....

Engineers Elect Lovejoy

[*Continued from Page 12*]

(b) Promotion by the industry of retarded field drilling through wider well spacing and unit operation.

(c) Advocacy by state regulatory bodies of formulae for lease allowables that will normalize, and not overstimulate, drilling. The acreage factor, Pogue said, will accomplish this result.

(d) Support by state regulatory bodies of prescribed programs of wide well spacing.

Questions Progue's Theories

Wallace E. Pratt, Houston, vice president of Humble Oil & Refining Company, was asked to comment on the paper. He responded with:

"There are some points in Mr. Pogue's paper that may be correct, but I just don't like them. Proration, as I conceive it, ought to be without effect on price. Price ought to be independent of proration. It is hazardous to employ proration to control price. If we do so we are skating on thin ice.

"I also look with doubt upon figure two of Mr. Pogue's which denotes a response of wildcat drilling to price. I doubt if the control is as absolute as his curve might indicate," Pratt said and inferred the doubling of reserves in the past 10 years might have been responsible for the curve.

"The rate of drilling," he continued, "corresponds to the rate of discovery. You stimulate drilling when you make a discovery. When the discovery is large, the wells drilled become more numerous. In New Mexico we have had a price of 75 cents per barrel for oil, but we have had a triple increase in the number of rigs running there. That increase in drilling is obviously not due to any increase in price."

John M. Lovejoy, president of the American Institute of Mining and Metallurgical Engineers, next said:

"I am inclined to agree with Mr. Pratt that price does not control drilling, but am also inclined to believe that it does effect wildcatting."

Referring to proration he said:

"We've got to have proration whether it is a price factor or not."

Lovejoy injected an interesting remark on physical waste. Saying that if conceptions of waste control in East Texas were used as a yardstick what California could produce without physical waste would be only a small portion of what it is producing today.

Marketing Branch

Paul G. Blazer, president of Ashland Refining Company, Ashland, Kentucky, in his paper on "Marketing Conditions" declared the largest individual cost in the oil industry is the cost of marketing gasoline and blamed it largely on the existence of too many filling stations.

"The price of gasoline is high enough," he said, "to allow a well located refinery to make a reasonable amount of profit, but it is not high enough to warrant new refinery construction or to call back into use obsolete refinery equipment."

Blazer listed as one of the main marketing evils the policy of refineries trying to guarantee their customers a profit.

"More stations," Blazer declared, "mean less profit for the dealer and a higher cost to the oil companies. I don't think all the new stations have caused one gallon increase in sales. And the present marketing structure threatens to collapse of its own weight."

Blazer criticized sales departments of oil companies as being gallonage-minded rather than profit-minded, saying, "They are keeping open thousands of stations at a cost greater than it would be if they were kept closed.

"It would appear that oil companies ought to be permitted legally to agree not to build any more stations until conditions demand it. Gasoline prices should be posted at so much above the tank car price rather than at so much off (below) the retail price."

Blazer closed his talk with the interesting remark that consolidation of oil companies might cut down marketing costs.

Theron Wassen of Chicago, chief geologist of Pure Oil Company, was not present to read his paper on Michigan, so Dr. H. T. Mann presented it,

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CLARK
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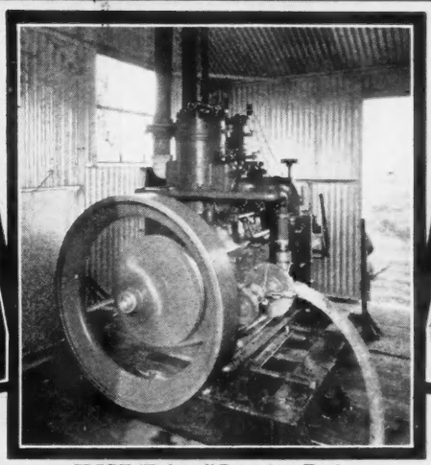
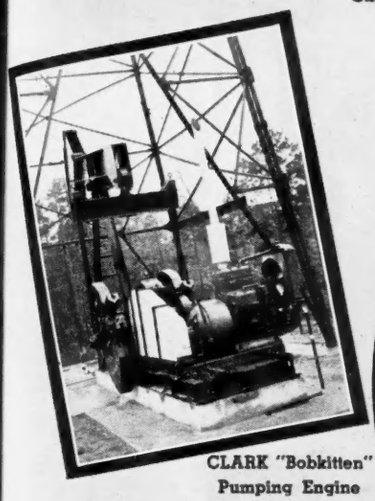
Oklahoma City



CLARK "Bobcat" Pumping Engine
Oklahoma City

CLARK
"Bobkitten" Installation
East Texas



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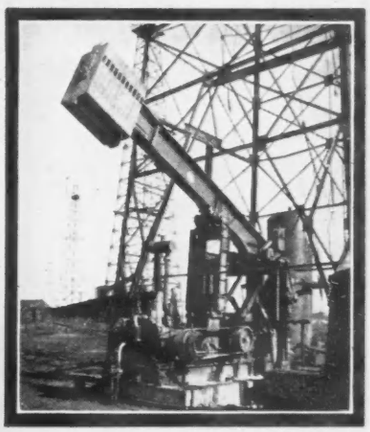
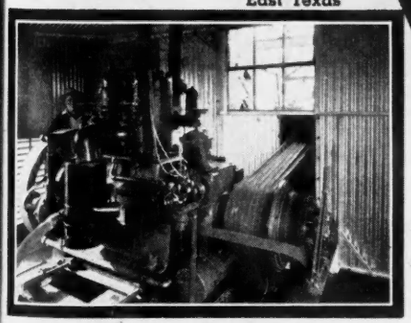
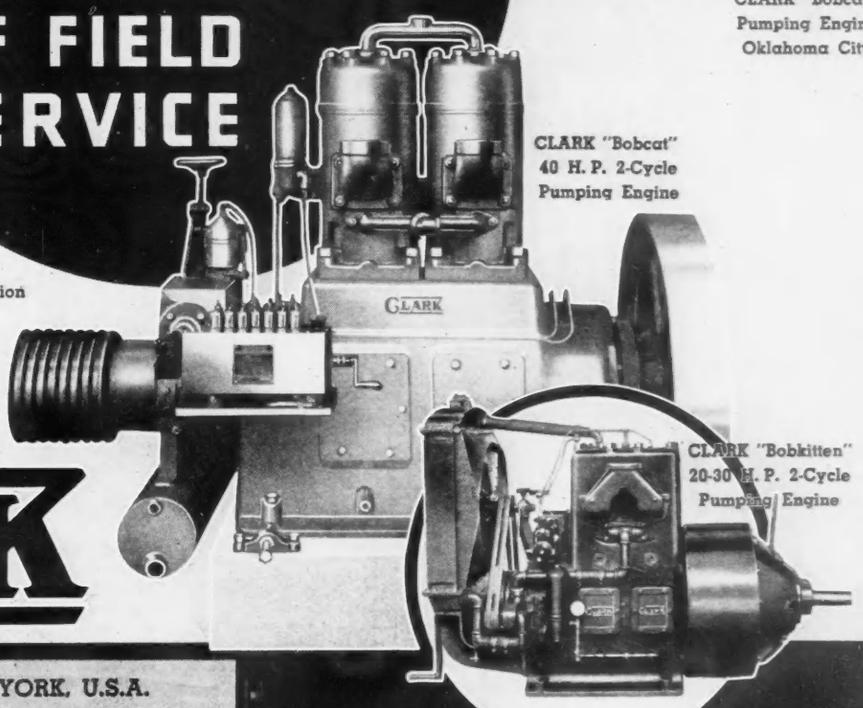


CLARK "Bobcat"
Pumping Engine
Oklahoma City



CLARK
"Bobcat" Installation
Seminole



CLARK "Bobcat"
40 H. P. 2-Cycle
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CLARK "Bobkitten"
20-30 H. P. 2-Cycle
Pumping Engine

Further details in 1936 Composite Catalog,
Clark Section, starting Page 371

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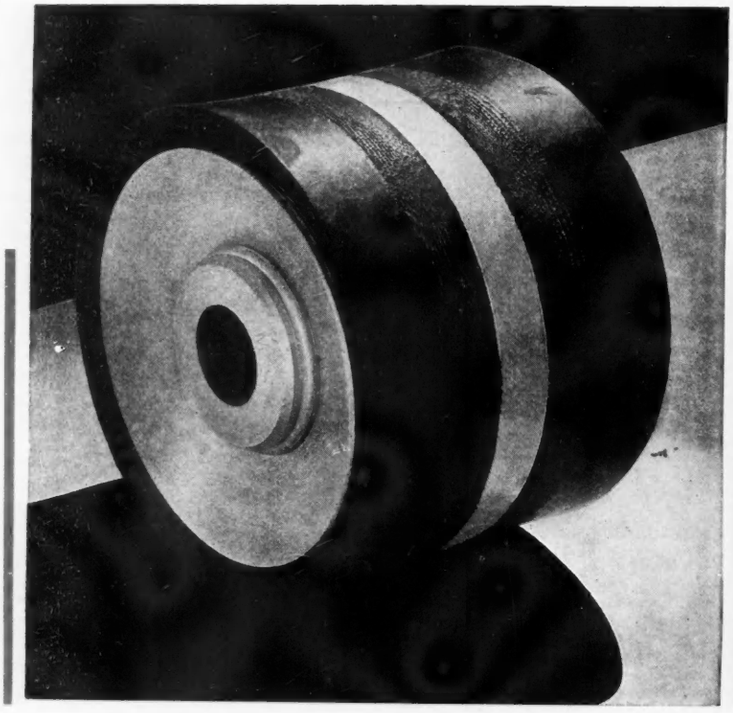

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pointing out that Michigan interest in 1935 centered around the Crystal field discovered in March. This field, which produced 350,000 barrels to the end of the year, was partly responsible for a 5,000,000-barrel increase in production of the state over 1934. While wildcatting continues active in the neighborhood of the new wells operators in the field proper are experimenting with returning salt water to some of the formations.

Central Michigan continued to contribute the bulk of the state's production.

In discussion R. A. Smith of Lansing, Michigan, geological survey, said there were wildcats in 44 counties in Michigan in 1935, as against 34 counties the previous year, as an indication of the growing importance of Michigan as a possible source for crude oil. "But," he added, "we are covered up with glacial deposits ranging in thickness up to 1200 feet, a condition which is going to call for the best in engineering skill."

Smith decried the waste of money in Michigan caused by bringing into the territory rotary equipment much heavier than necessary. He scored the practice of attempting to apply Gulf Coast or other technique to drilling problems in Michigan instead of formulating practices based on local conditions.

Questioned about the use of geophysical methods in Michigan, he stated some kinks would have to be worked out before these methods could be used to advantage there.

Papers on Mississippi and Missouri, prepared by Henry Toler and Frank C. Greene, were passed over hurriedly due to lack of important developments in those states.

Montana, according to Eugene S. Perry's paper, which was presented by Dr. Frederick G. Clapp, was of interest because of the statement brought out that acidizing has resulted in making oil producers from some bone dry wells there. From the standpoint of commercial production, Montana's outstanding development was extension of Cut Bank field, which yielded 2,000,000 barrels of oil last year. Recent completions in the field have shown a vast difference in the porosity of the limestones containing the oil.

New Mexico was very active during the year, it was revealed in the paper of E. H. Wells, president of the New Mexico State School of Mines, which was read by Mark Perry. The state recovered 20,000,000 barrels in 1935, a substantial increase over 1934, and completed 260 oil wells, eight gas wells, and 72 failures. Acidizing has been characterized as highly effective in New Mexico.

The greatest district development in New Mexico, according to the paper, was the Monument area, where the discovery well this past year had an initial production of 3500 barrels from 3945 feet. The Monument field has 28 producers and no failures, and big wells are characteristic of the Permian white lime from which the field produces.

Prediction was made in the New Mexico paper that Monument may soon approach Hobbs in size. The oil is 34 gravity.

Hobbs field was given a potential of 2,116,000 barrels at the end of the year, due to extensions northwest, northeast and east. Eunice is the busiest field in the state, having 21 rigs running at the close of the year.

R. E. Lamborn's paper on Ohio was of interest chiefly for the historical nature of some of the older sands there which have been exploited since 1860. The state produced 4,080,000 barrels in 1935 and recorded 1022 completions, according to Lamborn, who is an instructor in Ohio State University. Of these completions, 630 were producers. Incidentally, the largest well completed last year in Ohio had an initial production of 300 barrels.

Oklahoma's paper was scheduled to have been presented by E. G. Dahlgren and H. E. Rorschach, of Tulsa, but was read in their absence by Harry Power of Tulsa. First among important Oklahoma events in 1935 was the discovery of deep production in southern Oklahoma, opening a large area for Simpson formation wildcatting. Fitts pool, with eight producing sands, had 200 upper Simpson sand producing wells, and Jesse pool, discovered in November, 1935, appears similar to Fitts in structure according to the paper.

Another major development for Oklahoma was the extension of the Oklahoma City Wilcox zone. Bottom hole pressures there are averaging between 500 and 600 pounds, according to the authors.

Among the technical advancements

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listed for 1935 was the increase in water flooding in Oklahoma. Unitization of South Burbank field was also listed as an interesting development.

Wallace Ralston's paper on East Texas predicted many wildcat wells in 1936 for the 11 counties included in his report. These embraced East Texas, Van, Cayuga and Long Lake fields.

Ralston estimated 4036 wells had been completed in East Texas field in 1935 and that 10,000 acres had been added to the field, giving it a density of one well to each six and a half acres.

Producing wells in the field were placed at 19,500. They were divided into 17,600 flowing wells, 180 gas lift wells, the remainder pumping wells. Of the total, 1126 were reported making water.

Cumulative production of East Texas field to the end of 1935 was put at 818,478,385 barrels and 1935 production was figured to be 174,230,150 barrels, a material decrease from the amount of oil this field produced in 1934.

Raymond B. Kelly, assistant division manager, Pure Oil Company, Fort Worth, and Paul R. Martin, chief scout of the same organization, stated in their paper on Central Texas that the most interesting development of the area during 1935 was discovery of production at the New Pearsall field in Frio County. They stated 480 acres had been proven for Navarro formation production and 40 acres for Buda formation. There is Austin Chalk production, too.

The per acre yield to date in Central Texas was estimated by the authors to be 9090 barrels. They concluded the paper with a forecast of greater drilling activity for the district in 1936.

North Texas district was passed over briefly with the statement that Ordovician lime production possibilities probably would be thoroughly tested in 1936 due to discovery of that type of production just across the border in Oklahoma recently.

Jim Wheeler, petroleum engineer with Marathon Oil Company at Iran, Texas, and H. W. Matthews contributed a paper covering West Texas, the high spots of which were that the Sayre field is considered the most prolific field in West Texas and that the technical interest of the district in the past year was focused largely on the success of acidization and shooting.

The authors forecast material extensions in 1936 in partially developed fields. Although few new fields were discovered in 1935, a number of minor extensions were made.

North Central Texas was passed quickly in the symposium as having no developments of importance during 1935, as was Utah, with the exception of five dry wildcats. West Virginia effected a few extensions to proven fields, but nothing else of importance.

Sucker Rods

Emory Kemler, Gulf Research and Development Corporation, led off the morning session by presentation of a paper titled, "Investigation of Experimental Methods of Determining Sucker Rod Loads," which drew considerable comment, particularly the part inferring the dynamometer could not be used broadly enough in such investigations.

"Mathematical solution of the problem is impractical to use because of the simplifications that have to be made," Dr. Kemler said, "to get a solution and the tremendous amount of numerical work that is necessary after such a simplified solution has been attained." He then went on to show how analogies and models could be applied to the solution of the problems of measuring the plunger motion simultaneously with the rod motion under operating conditions, but that they would not be practical.

Load on Rods

"Loads set up in a sucker rod string during the ordinary pumping cycle consist of the weight of the rods, the force required to accelerate them, the weight of the oil, and force required to accelerate the oil on the up-stroke, rod friction, stuffing box and other frictions common in a pumped well," he stated. Long sucker rod strings, and the attendant long string of oil, act as springs which affect the transmission of the polished rod action.

Dr. Kemler stated that Dr. Morris Muskat, in a private report to Gulf Research & Development Corporation, had suggested the use of an electrical model to represent a model oil well as a possible method of studying sucker rod stresses. Using the electrical model, the differential equation for the electrical system would have to be identical in form with that of the mechanical system and the boundary conditions would have to be the same for the two systems.

Futuristic Ideas

V. H. Wilhelm, petroleum engineer with The Texas Company at Los Angeles, was the author of one of the most interesting papers presented at the morning session. In the absence of the author, the paper was read by Hallan N. Marsh. The paper early introduced a statement to the effect that "the fancy of today is the realization of tomorrow."

Dr. Wilhelm predicted directional drilling would play a major role in future development of oil structures, especially those with thin sand bodies and steep dips. His paper claimed greater ultimate recovery as a result of applica- of directional drilling.

"In one field, where the vertical thickness of sands was approximately 550 feet, wells drifting in at an angle as great as 55 degrees from the vertical had over 1100 feet of perforated pipe in contact with these sands," his paper read. It listed the following advantages as among those that could be attributed to development of a field by utilization of directional drilling.

(1) Centralization of operation by using a localized area from which to drill all necessary wells.

(a) Directional drilling allows the operator to use only one set of boilers, and the derrick can be skidded from one location to another.

(b) Instead of radiating pipe lines scattered throughout a field, all the oil could be brought to the surface within a limited area. Hence, there would be less expenditure for transportation of pumpers and tank facilities. Pulling operations could be performed by an almost permanent installation at a central point. It would be practical to use a large drum of about 40-foot diameter to roll up pump rods on as a well is pulled.

(2) With directional drilling, wells may penetrate the sand to the edge-water line; as the edge water encroaches, wells may be progressively plugged. In this manner, the directional wells will enjoy a long life of profitable production.

(3) It is estimated that in a structure of suitable type only one third or one fourth as many wells directionally drilled would be required to drain a property. According to Wilhelm, if it took six or eight vertically drilled wells to drain a property, two directionally drilled wells should accomplish the same job.

(4) Wells would have a greater drainage area if drilled away from the vertical, or, roughly, drilled in such a manner that the path travelled by the bit would lie about in the same horizontal (or near-horizontal) plane with the oil sand.

(5) In protecting a property line it would be necessary to drill only two wells to take the place of about eight wells drilled vertically.

(6) In a thin, steeply dipping sand in a monoclinal structure, it would be possible to radiate wells so that the number of wells required to adequately drain the zone would be much less than the number required with normal, vertical drilling.

In all the advantages listed from directional drilling, he requested those studying his paper to bear in mind that such advantages assumed that the field was unitized or under ownership of one operator.

Waste Water Injection

Another glance into the future on this paper was with respect to recovering more oil from a reservoir as a result of injecting waste water back into the reservoir. It was suggested that edge wells be used for this purpose to increase the ultimate recovery from wells located up-structure. Wilhelm suggested this method could be put to use in East Texas field. His point was that while water injection is already used in a few isolated areas its use will become more general in the next few years.

Another thing predicted was recovery of oil in exhausted fields, or nearly exhausted fields, by employing a process somewhat similar to the Ranney mining process. "In California," the paper read, "there are many fairly depleted oil fields." There it would be possible to drift shafts under the shallow oil zones, drill holes upward into the sand from beneath, insert perforated pipe, which would be cemented in the underlying shale, and produce the oil. The recovery of oil could be hastened, it was stated, by pumping water from the surface into the conventional type of oil wells previously drilled in the old field.

"Oil mining will become a common practice in the oil industry within a few years, especially in fields where recovery depends mainly on gas expansion," he predicted.

In the discussion several took issue with the conclusion, particularly T. V.

Moore of Houston. Harry Power of Tulsa said it would be all right to follow the threatened deluge of directional wells but that he was a little worried about what was to be done when the time to pump them arrived.

E. A. Stepenson injected the remark at this point that he objected to propaganda that was going out to the effect that we had an enormous amount of oil reserves. "The immediate supply of oil is extremely limited, whether we like it or not," he said.

UNION EARNINGS UP

Annual report shows increase in activity

Los Angeles.—Union Oil Company of California showed net profit of $1.15 a share in 1935 compared with 66 cents in 1934, according to the annual report of the concern. For 1935 the net profit was $5,038,286, as against $2,902,733 for 1934. In both years there were 4,386,070 shares outstanding.

The company's production, subject to royalty, of crude oil and natural gasoline in 1935 was 18,717,201 barrels, as compared with 14,928,305 barrels in 1934. The increase reflected the generally higher crude production in California the latter part of 1935, in absence of curtailment.

The report stated the company drilled actively in 1935 to comply with lease requirements and to seek extension of proven fields and deeper zones therein, also in testing new areas to develop crude oil reserves. The company completed 95 new wells with combined initial production of about 81,000 barrels daily in 1935, and at the end of the year had 15 active drilling wells, compared with 17 a year previously.

The company's sales of products in 1935 totaled $61,169,527, or $3,801,072 more than in 1934. The total quantity sold was up 1,563,174 barrels at 30,403,727 barrels for 1935. Fuel and gas oil prices were improved over the several preceding years.

Expenditures for oil lands and development in 1935 amounted to $6,533,091, consisting mainly of new drilling, additional field facilities and leasehold rights and interests, principally in the Dominguez, Santa Fe Springs, Playa del Rey, Kettleman Hills, Mountain View, and North Belridge fields.

On December 31, 1935, the company had 988 wells producing or shut in, and 13 active and three inactive drilling wells. In addition the company had an interest in 101 wells producing or shut in and in two active drilling wells, operated by others. The company holds 172,127 acres of fee lands and 40,447 acres of leases in California; 560 acres of leases in New Mexico; 19,581 acres of fee holdings in shale lands in Colorado; 32,146 acres of leases in Texas; and 405,554 acres in fee in Colombia, S. A.

The company spent $574,401 in 1935 for improving existing pipe line facilities, $69,508 on marine equipment, and $337,188 for additions and improvements to refineries, natural gasoline absorption plants, and gas facilities. Additions to marketing stations totaled $1,267,805. At December 31, 1935, there were in operation 497 domestic and foreign bulk stations and commission agencies, 728 retail service stations, 172 portable islands, and 12 airport units. The company owned 784 tank cars, 996 auto trucks, and 167 automobiles.

Estimated Demand

FOR MARCH 2,738,900 BARRELS DAILY

Washington, February 21.—An oil output of 2,738,900 barrels a day, 90,800 barrels over the recommended production for February, will be required to meet expected demand in March, it was announced February 21 by the Bureau of Mines.

Unusually heavy additions to gasoline stocks during the past five or six weeks indicate that consumption in January and February will be considerably less than estimated, the report stated, but this apparent decline in the use of motor vehicles, may be partially offset in March, and the estimate of domestic demand for motor fuel, including natural gasoline losses, has been placed at 35,000,000 barrels, or about nine percent over the same month last year.

More to Storage

Confidential reports to the bureau from exporters of gasoline, it was disclosed, indicate that foreign shipments next month will be about 20 percent higher than in March, 1935, and the estimate of exports has been raised to 2,800,000 barrels. An addition of 1,780,000 barrels in gasoline stocks is recommended for the coming month on the assumption that the East Coast, Indiana-Illinois, Oklahoma, Texas inland, Louisiana Gulf Coast and Rocky Mountain districts will meet their objectives for March 31 stocks. The remaining districts will probably exceed their respective objectives as of that date, it was declared, but it would be undesirable from an operating standpoint to recommend reductions in those districts sufficient to offset this condition by the end of the month.

Deduction from total demand plus stock increase of direct sales, increased from 700,000 barrels this month to 900,000 barrels in March, chiefly to offset the inclusion of natural gasoline losses in domestic demand, shows 38,680,000 barrels as the required production of finished and unfinished gasoline for next month. Allocation of this production among the various districts gives the East Coast 6,760,000 barrels; Appalachian, 1,450,000 barrels; Indiana-Illinois, 6,340,000 barrels; Oklahoma, 2,440,000 barrels; Kansas-Missouri, 2,370,000 barrels; Texas inland, 2,760,000 barrels; Texas Gulf Coast, 8,150,000 barrels; Louisiana Gulf Coast, 1,260,000 barrels; Arkansas-Louisiana inland, 810,000 barrels; Rocky Mountain, 810,000 barrels, and California, 5,530,000 barrels.

Natural Gasoline

Recognizing seasonal influences, the bureau has reduced the percentage of natural gasoline in the refinery gasoline to be made next month from 6.8 to 6.3 percent, equivalent to 2,440,000 barrels which, deducted from the total required production, leaves 36,240,000 barrels of gasoline to be made from crude. Estimating the yield at 43.99 percent, slightly below that of February, 82,380,000 barrels of crude to be run to stills is estimated by the bureau.

Runs to stills of foreign crude for the month are estimated at 2,900,000 barrels; fuel and losses are estimated at 2,300,000 barrels, and, dependent largely on the maintenance of heavy shipments of crude from the Corpus Christi district, total exports are placed at 3,900,000 barrels.

Provision is made for the withdrawal of 25,000 barrels a day from crude oil stocks, of which 20,000 will be in California and 5000 in all states east of California.

On the basis of the factors outlined, the bureau forecasts a daily required production in March of 2,738,900 barrels against 2,648,100 barrels for February, with all states except Michigan, Colorado, Indiana and Kentucky sharing in the increase.

Recommended production by states is as follows:

Texas, 1,104,000 barrels against 1,068,200 barrels in February; California, 538,800 against 529,600; Oklahoma, 506,300 against 483,700; Louisiana, 151,400 against 141,100; Kansas, 142,000 against 137,400; New Mexico, 64,200 against 61,300; Pennsylvania, 44,800 against 42,900; Michigan, 44,300 against 44,800; Wyoming, 34,800 against 34,400; Arkansas, 31,900 against 29,900; Kentucky, 14,500, unchanged; Montana, 12,400 against 11,900; Illinois, 11,600 against 11,200; New York, 10,800 against 10,500; Ohio, 10,800 against 10,400; West Virginia, 10,400 against 10,300; Colorado, 3700 against 3800; Indiana, 2200, unchanged.

TEXAS HEARING

Indicated East Texas no material increase

Austin.—At the hearing before the Texas Railroad Commission last week Commissioner C. V. Terrell announced that the Bureau of Mines had fixed the market demand for Texas crude during March at 1,104,000 barrels per day. This is an increase of 35,700 barrels over the bureau's estimate for January, and an increase of 87,000 barrels over the December demand as they calculated it.

Major companies again urged the commission to revise the method of allocation in the East Texas field and include a factor for acreage. The East Texas operators present expressed a great deal of interest in the increase in demand reported by the Bureau of Mines and indicated by their questions that they hoped for a higher allowable for the East Texas field. This hope, however, was discouraged by the recommendation of V. E. Cottingham, Commission Petroleum Engineer, who urged the commission to limit the East

Texas allowable to 425,000 barrels per day in March.

Cottingham reported that the average bottom hole pressure of the East Texas field had increased seven tenths-pounds during the month ending February 12. He pointed out that the allowable during this time averaged 1639 barrels per day less than it had during the previous month when the pressure had declined more than five pounds or an average of .399 pounds per million barrels produced.

Since the average production during the month ending February 12 was 434,463 barrels per day the allowable recommended by Cottingham would mean a cut of 9463 barrels per day.

One operator protested against further cuts in the field and charged that oil is now being imported from Louisiana to supply the demands of East Texas refiners. He reported that the oil was coming in at the rate of 2000 barrels per day, being transported by tank car.

Phillips Petroleum Company urged a further reduction in the Panhandle allowable. During the past month connections, with allowables of 2000 barrels, which were held by Phillips, have been diverted to Humble Oil & Refining Company. Phillips, however, is still taking in excess of 16,500 barrels per day, which it considers is the maximum of their demands. At the hearing last week company representatives told the commission that unless reductions were made, or relief obtained in some manner, it would be forced to prorate its total nominations of 16,500 barrels among the wells to which they were connected.

Several requests for increases in allowables were received from operators in West Texas.

An increase of 10,000 barrels per day for the South Ward field and 250 barrels for Crockett County was requested by The California Company. Representatives of this concern said that it plans immediate development of its Crockett County property, which has been delayed for several years.

McClintic operators asked for a 425-barrel increase. A raise of 160 barrels was asked for the Fuhrman's field in Andrews County.

Gulf Oil Corporation asked that the allowable for the North Ward field be increased 5850 barrels to 12,000 barrels in order to supply the demands of its Sweetwater refinery.

A raise of 1280 barrels was requested by the Stanolind Oil & Gas Company for the North Cowden field. C. G. Condra, the company's attorney, told the commission that the higher allowable would result in saving 1600 feet of gas with every barrel of oil produced since the wells would have lower gas-oil ratio produced at a higher rate.

The hearing on the Yates field which was scheduled for last week was postponed again this time until February 26, when a special hearing will be held at Austin.

Livingston operators asked that the allowable for that field be increased 1334 barrels to 4000 barrels daily.

A raise for the Sam Fordyce field was requested by the Hidalgo County Producers' Association. They pointed out that a new pipe line had been built into the field with a daily outlet of 5000 barrels, and that the additional oil would be sent through this line to tidewater.

Billings Well Tested

COLD WEATHER DELAYS FIELD WORK IN OKLAHOMA

WEEKLY STAFF REPORT

Tulsa.—The past week brought no Oklahoma field news of great importance except from discoveries of the week before and from important wildcat tests which are nearing the objective horizons. Close to zero temperatures during a part of the week and light snows over a large part of the state caused the closing down of many wells and some have yet to get under way again despite the moderating conditions which prevailed at the weekend. Further testing of the new Wilcox sand well in the old Billings pool of western Noble County shows it to be a gusher of major importance. In the southern part of the state one wildcat test where drill pipe was thought to be hopelessly stuck was successful in soaking the pipe loose with oil and was drilling ahead. In the old Fox pool of northwestern Carter County the Simpson discovery well was redrilling within 583 feet of the depth at which it obtained production of gusher size last October.

New work was on a decided increase even in the face of bad weather, scouts having made 56 first reports. Pontotoc county came into a real lead with 22 first reports; Seminole and Creek counties had five each; Pottawatomie County, four; Osage County, three; Carter, Jackson, Oklahoma, and Okmulgee Counties, two each; and Kiowa, Caddo, Noble, Hughes, Payne, Okfuskee, Pawnee and Tulsa Counties, one each. Included in 44 completions were 29 oil wells which added 24,548 barrels to the state's cumulative initial production, four gas wells with combined initial volume of 21,300,000 cubic feet, eight dry holes and three abandoned locations. One wildcat completion was a gas well and another was a dry hole. Four old wells were deepened 967 feet. Total footage was 105,778 feet.

Billings Well Tested

Phillips Petroleum Company and Shell Petroleum Corporation's McCaughtry 1-A, NE NE NE 21-23n-2w, new Wilcox sand well in the old Billings pool of western Noble County, yielded 2335 barrels in six hours when reopened February 19. During the first 30 minutes, flowing through a two-inch choke, it yielded 487 barrels. The choke was then reduced to one inch with the following gauges: first 30 minutes 110 barrels; second hour, 443 barrels; third hour 346 barrels; fourth hour 283 barrels; fifth hour 304 barrels; and sixth hour 362 barrels. Formation pressure at 4200 feet was 1790 pounds per square inch and the temperature at that point was 134 degrees F. The gas/oil ratio during the test period was 1060 feet with a casing pressure of 700 pounds per square inch and a gas volume of 7,500,000 cubic feet through the one-inch choke. It is estimated that the well will make about 36,500,000 cubic feet of gas per day. Gravity of the oil was 43.4 degrees at 82 degrees F. Production is coming from 23 feet of Wilcox sand topped at 4235 feet.

Northwestern Pawnee County

Magnolia Petroleum Company was drilling below 4100 feet in its Miller 7, SW NW NW 4-22n-3e, an old well in the old Morrison pool of northwestern Pawnee County. The well originally was completed in June, 1925, yielding 564 barrels initially from Wilcox sand at 4003 to 4069 feet.

Oklahoma City District

In the North Extension or "Mansion Area" of the Oklahoma City pool the principal activity was in the taking of new leases in the area north of the state capitol building where an attempt will be made to extend the drilling zone by vote of the municipality. Empire Oil and Refining Company and Heenan-Coe, Incorporated, have taken lease on the east 80 acres of Woodlawn golf course, a 120-acre tract which lies on Lincoln Boulevard north of the capitol building. The lease is described as the east half NW 22-12n-3w. Under the terms there will be no drilling on the tract until the lessees are forced to do so to protect the property from drainage by offset wells. The nearest production at present is approximately three quarters of a mile to the southeast.

Release of geological data in regard to the northern drilling well in the "Mansion Area" proved of interest to many who had believed the test running so low that it probably would not make a producer. The test is Phillips Petroleum Company and Black Gold Petroleum Company's Sawyer 1, SE NE NE 22-12n-3w. Top of the Checkerboard lime was reported to have been 5379 feet; Oswego lime, 6120 feet; base of the Pennsylvanian, 6315 feet; top of the Wilcox sand, 6384 feet; and total depth, 6394 feet. It was cored from 6389 to 6394 feet, recovering saturated Wilcox sand. The 8⅝-inch casing was cemented at 6394 feet.

In the Moore area of northern Cleveland County Sinclair Prairie Oil Company et al were drilling below 6220 feet and had apparently about a thousand feet yet to go to get second Wil-

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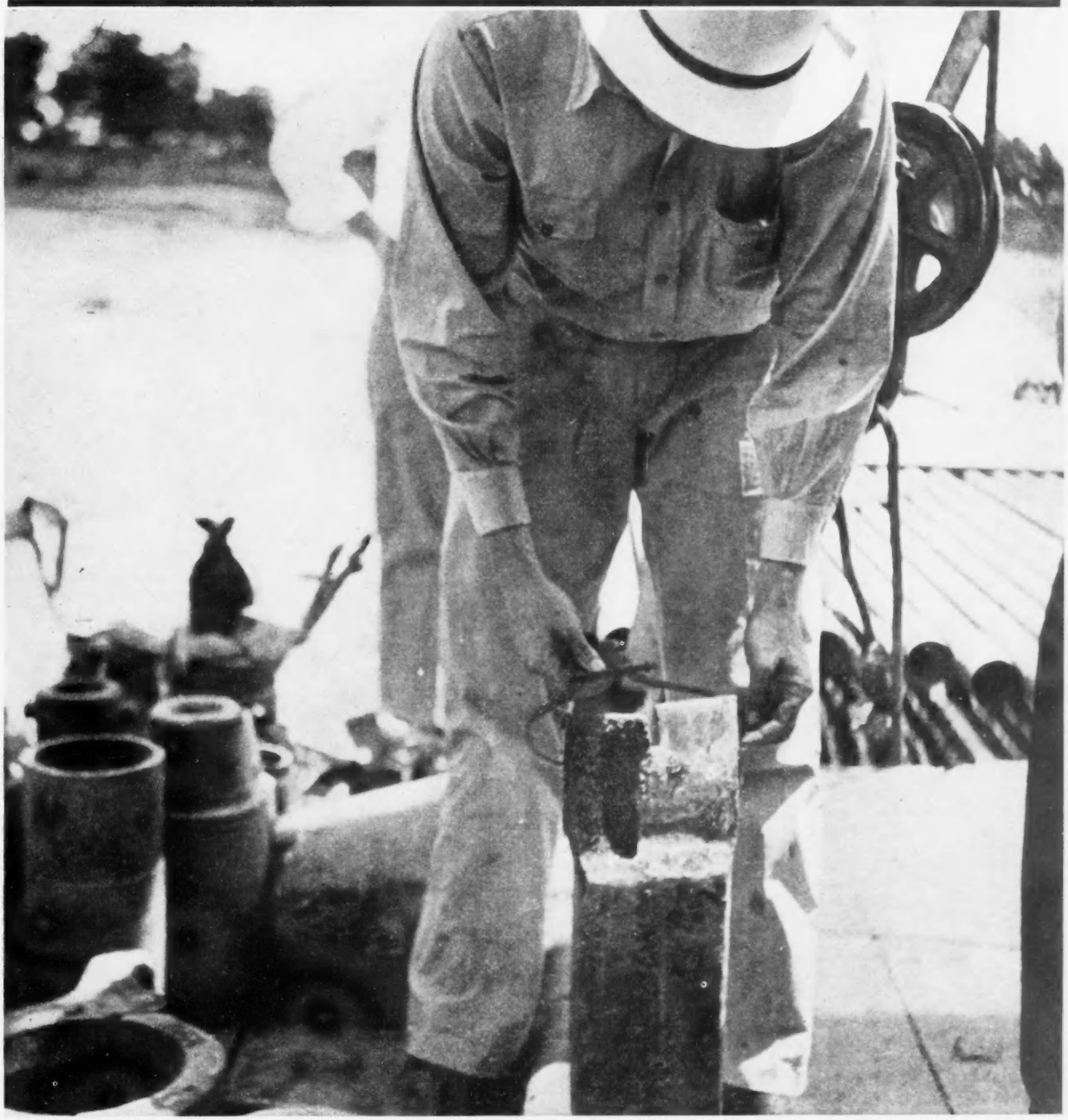


'INCOR' 24-Hour Cement

cox sand in their Marvel 1, NW SW NE 21-10n-2w. It is one location west and three north of the discovery well which was a large gas well at completion in 1935.

W. J. Sherry et al have announced location for Johnson 1, NW NW NW 20-18n-3e, a community test, three miles west of the old Mehan pool in south central Payne County. The test, which will have as its first objective the Bartlesville sand, is located in about the center of a 2560-acre block owned in community by Sherry, the Devonian Oil Company, the Texas Company, Sinclair Prairie Oil Company, and Denver Producing & Refining Company.

Southern Oklahoma

Three important Southern Oklahoma wildcat tests were holding the interest in that part of the state although none is due for immediate production. Sixteen miles northwest of Marietta in northwestern Love County, Sinclair Prairie Oil Company's Stockton 1, SE SE SW 26-6s-2w, was drilling below 6525 feet after soaking the drill pipe loose at 6348 feet.

Five miles northeast of Marietta, Amerada Petroleum Corporation and Stanolind Oil & Gas Company were drilling below 6210 feet in Westheimer 2, SW SE SW 27-6s-2e, on the Criner Hill Trend. This test apparently is in a zone which cannot be correlated with the type section.

In the old Fox pool of Northwestern Carter County, Carter Oil Company et al's Williams 1, SW NE SW 27-2s-3w, was drilling below 7300 feet, within 788 feet of the depth at which it blew out and flowed wild for almost a week last October. At that time it was estimated at from 5000 to 15,000 barrels. Drill pipe was stuck and the hole had to be redrilled from 6089 feet, where a whipstock was set in open hole.

A mile to the west, Gulf Oil Corporation's Fitzgerald 3, SE NW SE 28-2s-3w, had been drilled to 3035 feet where 1000 gallons of acid was introduced into the hole. This test will be carried to the Simpson zone if production of commercial importance is not found in the upper zones.

Southeast of the Hewitt pool, Carter County, the Texas Company and J. H. Hudson were cleaning out with total depth at 4164 feet in Cathey 1, SE NE NE 6-5s-1w. Operators had several hundred feet of low gravity oil in the hole from sands at 4098 to 4118 feet and from 4135 to 4157 feet. The casing was damaged when hole was shot and the crews had just completed swaging out.

Caddo County

Denver Producing & Refining Company's Sah-Cam 1, C SE SE 33-10n-10w, second test in the Binger area of Caddo County, was washed 12 hours through tubing early in the week but reported no showings of oil or gas. It is looking unfavorable at 1012 feet, the total depth.

Two and one-half miles northwest of the Fitts pool, Gulf Oil Corporation was drilling below 6160 feet at Emry 1, SW SW NE 15-2n-6e. This test was started under a 4500-foot contract. When 4514 feet was reached and the bit was still in Atoka formation, a new contract was drawn up calling for 6500 feet. The last marker reported was Viola lime topped at 5975 feet.

Shell Petroleum Corporation's Hill 3, SW SE NW 30-3n-10e, was drilling below 4017 feet. It is seven miles northeast of Centrahoma where Carter Oil Company et al recently completed Thompson 1 as a dry hole.

In the Jesse pool, five miles southeast of the Fitts pool, the Texas Company was below 3960 feet in Simpson 1, SE NW SW 12-1n-7e, two locations south and two west of the discovery well.

EMPLOYMENT DOWN

Oklahoma City.—According to State Labor Commissioner W. A. Pat Murphy, oil producing companies in Oklahoma reported a total employment of 6518 persons during January, an increase of 0.8 percent over December, 1935. Total weekly earnings were reported to have been $171,662.32 or an average of $26.34 per person per week and an increase of 1.5 percent over the preceding month. Compared with one year ago employment was down 1.2 percent and earnings down 3.8 percent.

Refineries employing 5168 persons at a total weekly pay roll of $136,282.82 or $26.37 each, showed a drop of 0.6 percent in employment and a drop of 0.9 percent in pay rolls compared to the preceding month and a drop of 2.1 percent in employment and 1.5 percent in pay rolls compared to a year ago.

OKLAHOMA
Completions

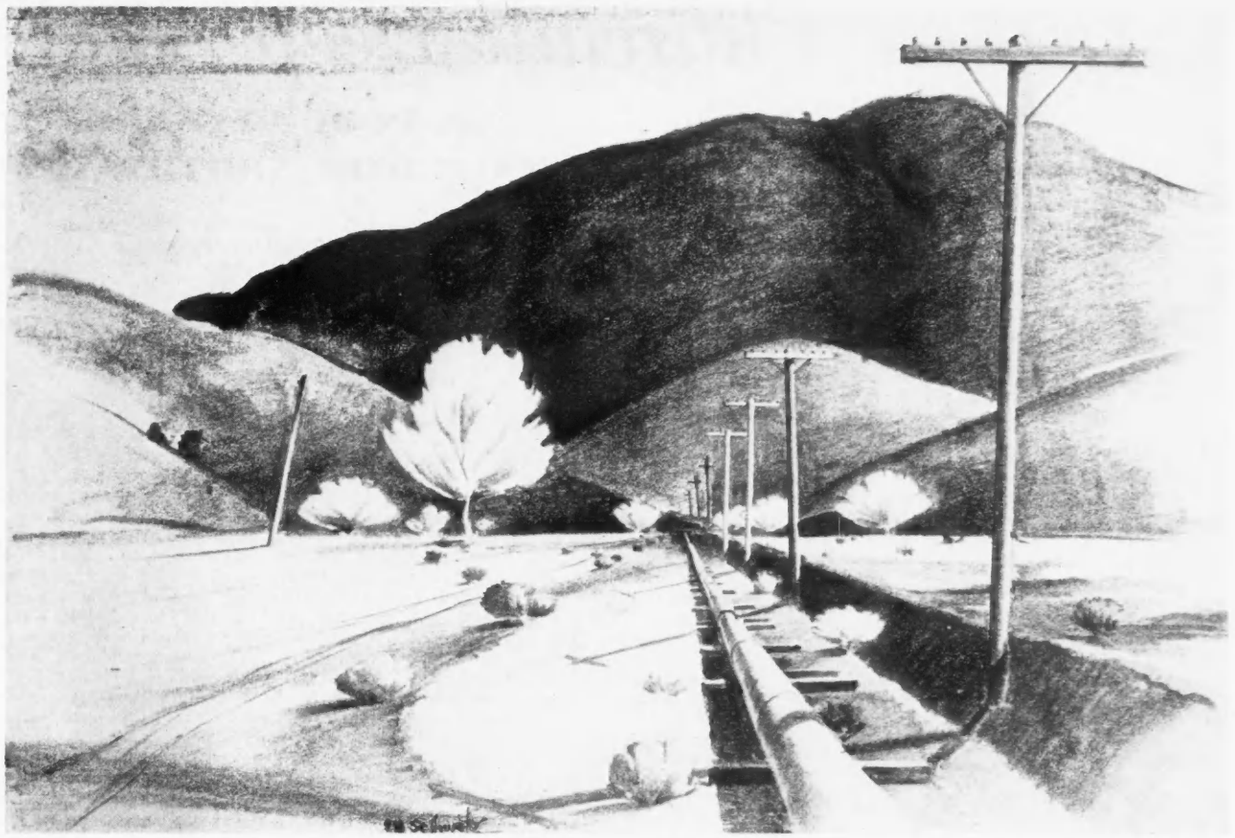
Company, Well and Location	Init. Prod. Bbls.	Depth
CARTER COUNTY—		
Salome, Brady 1, sw ne sw 19-1s-2w	lcn.	abd.
Evans et al, Dickerson 1, ne sw se 28-1s-2w	lcn.	abd.
Samedan Oil Co., Higgins "D" 1, se se nw 6-2s-2w	125	2171
Shell Pet., Wirt Franklin 59, sw ne ne 8-4s-3w (pb 1000)	12	1109
COMANCHE COUNTY—		
Emenheiser, Shull 1, ne nw sw 29-2n-10w	*	537
CREEK COUNTY—		
Mid-Continent Pet., Artusse 10, ne ne ne 14-17n-7e	2	1885
Sinclair Prairie, Dacon 21, csw se 16-17n-7e (otd 2425)	15	2825
Litchfield 28, sw ne ne 21-17n-7e (otd 2824)	75	2927
Shaw-Doak & Hughes, Ingalls 1, sw sw se 24-17n-7e	40	2546
L. B. Jackson, Nolan 3, nw ne ne 2-17n-8e	65	1579
Ellis Kury, Bruce 1, nw sw nw 22-17n-9e (pb 875)	¶1/10	925
Creokla Oil Co., Watashe 3, nw sw ne 4-17n-10e	15	2000
Bookout et al, Petroseek 2, cnl ne sw 12-19n-9e	*	2000
HUGHES COUNTY—		
Phillaine, McCaslin 2, ne ne ne 11-9n-8e	336	1752
The Texas Co., Meadors 1, cne ne 8-8n-10e	¶12	3100
JEFFERSON COUNTY—		
Heydrick, Seay 1, se nw nw 31-6s-5w	*	2107
MUSKOGEE COUNTY—		
Foltz, Bartlett 1, se sw ne 17-14n-17e	100	1886
OKFUSKEE COUNTY—		
Sherry et al, Washington 1, sw sw ne 21-13n-7e (pb 4130)	¶9	4349
OKMULGEE COUNTY—		
Anthony, Town Lot 1, sw ne ne 29-12n-14e	*	763
Reliance Oil Co., Anthis 6, ne nw nw 26-16n-11e	25	2921
OSAGE COUNTY—		
Barnsdall, 13, sw sw ne 10-21n-12e	16	1867
Carter Oil et al, Higdon 8, se nw ne 3-25n-6e	1755	2886
Gulf Oil Corp., Revard 2, sw nw se 26-26n-6e	65	2914
PONTOTOC COUNTY—		
Blackstock, Reese 1, se ne ne 35-2n-6e	¶2-3037	4480
Mid-Continent Pet., McKey 1, sw sw sw 20-2n-7e (pb 4335)	¶1¾-1807	4389
Fleetborn et al, Woolley 3, nw ne se 28-2n-7e	¶1¾-4487	4282
Skelly, Park College 5, se sw ne 28-2n-7e	¶2¾-5346	4288
Moore, Woodroof 8, se nw se 29-2n-7e (otd 4156)	¶2¼-3935	4391
POTTAWATOMIE COUNTY—		
Phillips Pet., Weldfeldt 2, se nw nw 2-7n-4e (otd 3933) (pb 4162)	120	4306
Helmerich & Payne, Wilsey 2, se sw se 7-7n-4e	206	3817
Phillaine, Garrett 3, nw se nw 28-7n-4e	738	4146
SEMINOLE COUNTY—		
Fortune, Harjo 1, ne nw sw 11-6n-6e	*	1384
Reynolds, Harjo 1, nw se se 13-6n-7e (pb 2829)	40	2838
Phillips Pet., Davis 1, ne sw se 2-7n-6e (pb 3850)	*	4280
Continental Oil, Milsey 2, se sw sw 11-7n-6e (otd 4221)	280	4312
Ross Oil & Berrett, Scroggins 1, ne sw sw 34-7n-6e (pb 2879)	*	2901
Sinclair Prairie, Maxey 2, se sw nw 1-8n-6e	264	4185
Shell Pet., Spencer 2, nw sw nw 12-9n-5e (pb 3750)	152	4319
Hopper 6, se sw ne 19-9n-6e (pb 2826)	350	4127
STEPHENS COUNTY—		
Sykes, Markham 1, sw sw sw 10-1s-8w	*	3042
The Texas Co., Tomlin 1, nw nw nw 15-3s-5w	32	1463
TULSA COUNTY—		
Owens, Carvey 5, sw nw nw 27-18n-14e	¶1/5	732

*Failures; †Junked; ¶Million cu. ft. gas.

CITY POTENTIAL

Oklahoma City.—The Oklahoma City pool, as of February 1, had an official potential rating of 584,952.20 barrels per day of which 559,350.66 barrels or 95.62 percent is credited to the Wilcox sand zone. Estimating the Simpson-Above-Wilcox zone, the Arbuckle lime zone and the unprorated Highley well at 7900 barrels per day, which is approximately the daily average January production for these zones, the total daily potential of the pool would be 592,852 barrels. This includes seven new wells in the north extension or "Mansion Area" which have a rating of 116,259 barrels per day. According to a report of the oil and gas conservation department of the corporation commission the pool produced a total of 4,364,884 barrels in January or a daily average of 140,803 barrels from 933 wells. As of February 1 a total of 602,986 barrels of under-production was cancelled and stocks for all zones amounted to 690,166 barrels. Net allowable for February was set at 4,659,557 barrels with all but the Wilcox and Cleveland sand zones being allowed to produce to capacity.

Phillips Petroleum Company continued to lead in total potential with a rating of 191,154.67 barrels for 135 wells



FROM WEST TEXAS TO THE COAST — *From a lithograph by E. M. Schwetz*

THE far-reaching system of petroleum pipe lines which converge on the Texas Gulf Coast bears witness to the importance of that section in the petroleum industry. Located in the Gulf Coast's largest city, the FIRST NATIONAL BANK in Houston has been privileged to serve oil men and oil companies engaged in the development of the coastal fields, and has itself developed complete banking facilities for their service.

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

or an average of 1416 barrels per well. Indian Territory Illuminating Oil Company has the largest number of wells of any single operator but since many of them are in the older Simpson-Below-Wilcox zone the total potential was 61,597.55 barrels, an average of only 215 barrels per well. New development in the north extension or "Mansion Area" gave Superior Oil Company of California the highest per-well potential with a total of 24,391.20 barrels for two wells. The next highest per-well potential was credited to British American Oil Producing Company with a total of 85,829 barrels for 14 wells or an average of 6131 barrels per well. Included in this group are four wells with a potential rating of 80,553 barrels in the "Mansion Area."

HAMILTON COUNTY
Is added to list of producing counties

Fort Worth.—Hamilton County was added to the list of producing counties in West Central Texas the past week when Seaboard Oil Corporation's T. K. Rea 1, situated on a large drilling block centering about 10 miles northwest of Hamilton, developed 4,000,000 cubic feet of gas from Marble Falls lime at 2405 feet.

It is about 20 miles southwest of gas production near Hico, Erath County.

Top of the Marble Falls limestone has been tentatively placed at 2369 feet according to E. B. Stiles, geologist stationed at the well. Major companies have been acquiring large quantities of long term leases at low prices within the past year and several groups of independents have taken drilling blocks including, Walter H. Grant, Ardmore, Oklahoma, with a test slated for the S. P. Drake 40-acre lease, Kuykendall Survey.

ARCHER COUNTY
Has well pumping from 40 feet

Wichita Falls.—The shallowest oil sand yielding production in Archer County has been uncovered by W. T. Hutcheson et al's Luke McCrory 2, south of Holliday which is pumping three barrels of oil daily from four feet of sand with the hole bottomed at 40 feet.

The well was completed in one day. It is on a 30-acre lease in Block 21, A. T. N. C. L. Survey.

Olson Drilling Company and James Gardner et al's Southwestern Life Insurance Company 1, wildcat on the Preston anticline in Grayson County, has redrilled to 4360 feet after plugging back from 5670 feet to 3535 feet to sidetrack section of drill pipe. Owners plan to set casing and make a production test of fine-grained sand bed logged in the original hole at 4441-82 feet, carrying gas and oil stain.

The projected deep tests by Port Bolivar Oil & Refinery Company in Grayson and Collin Counties have been idle since December. In the meantime a geophysical service has contracted to survey the two blocks for lease protection.

Churchill Deep Zone

REGA POOL EXTENDED HALF-MILE NORTHWARD

WEEKLY STAFF REPORT

Wichita, Kansas. — Field activity throughout the northern Mid-Continent was severely handicapped and in many instances stopped by the extremely cold weather and heavy snow which fell in some localities. However, several wildcat locations were staked, the old Rega pool in Tergo County was extended one-half mile to the north and a new productive zone was established in the old Churchill pool of eastern Sumner County. Scouts made 39 first reports which showed Rice County in the lead with seven new operations. Barton, Reno and Russell counties were tied for second rating with five starts each; Sumner and Cowley counties had four each; Ellis County, three; and Butler, Harvey, Greenwood, Ruch, Scott and Woodson counties, one each. Twenty-two completions resulted in 12 oil wells with total initial rating of 5739 barrels, two gas wells with combined initial volume of 34,500,000 cubic feet, six dry holes and two abandoned locations. Two of the wildcat completions were oil wells and three were dry holes, the five involving 16,172 feet of drilling. Two old wells were deepened 915 feet which with the 15 other completions brought total footage to 56,815 feet for the week.

New Horizon at Churchill

The old Churchill pool of eastern Sumner County was made attractive when Shell Petroleum Corporation's State 1, C SW 25-21s-2e, acidized Kansas City lime from 2116 to 2148 feet, the total depth, and had a gauge of 340 barrels in eight hours flowing and swabbing. The test was treated with 3000 gallons of hydrochloric acid, after which the tubing was pulled and the hole shut in for 10 hours. Hourly gauges before the treatment ranged from two and one-half to 25 barrels. Production was discovered in the Churchill pool in June, 1926, when Shell Petroleum Corporation completed its Churchill 1, NE NE SW 25-31s-2e, yielding 315 barrels initially from Stalnaker sand topped at 1822 feet and penetrated 46 feet. In January of this year Derby Oil Company added a new producing horizon to the pool when its Reitz 1, NW NE SW 25-31s-2e, produced 798 barrels initially from Arbuckle lime topped at 2663 feet and drilled to 2708 feet. These two discoveries should result in the deepening of a majority of the old Stalnaker sand wells.

Two tests, however, which reached the Kansas City horizon this week are dry and are being abandoned. Derby Oil Company's Reitz 2, NE NW SW 25-31s-2e, an old well drilled deeper, topped the Kansas City lime at 2191 feet, set seven-inch casing at that depth and was drilled to 2277 feet. It was treated twice with 1000 gallons of acid each time and shot with 10 quarts between 2213 and 2223 feet with only a small showing of oil and some water. The same operator's Reitz 3, NE NW SW 25-31s-2e, also an old well, topped Kansas City lime at 2203 feet, set 5 3/16-inch casing at that point and was drilled to 2245 feet. It was treated with 1000 gallons of acid and shot with 10 quarts from 2220 to 2230 feet with only a small showing of oil and water. Both were being abandoned. Shell Petroleum Corporation's Shore 1-B, NE NW SW 25-31s-2e, topped Kansas City lime at 2157 feet, set seven-inch casing at 2160 feet and was drilled to 2179 feet from which depth it swabbed 280 barrels of oil in 24 hours. After being treated with 3000 gallons of acid it pumped 761 barrels of oil in 24 hours.

Two wells were completed during the week in the nearby Oxford pool. Shell Petroleum Corporation's Rothwell 6, NE NE NE SW 14-32s-2e, was reported to have gauged 1414 barrels in three hours after being treated with 8000 gallons of acid. Production is from the Simpson Group. Lario Oil and Gas Company and Barnsdall Oil Company's Wenrich 14, SE SE SW NW 23-32s-2e, was given a preliminary rating of 1255 barrels per day and the same operators' Wenrich 15, NW SW SE NW 23-32s-2e, had topped the lower pay at 2927 feet where it is being standardized.

Four miles south of Oxford over the line in western Cowley County Craft et al had staked location for W. S. Taylor 1, SW SW NE 32-32s-3e. Nearest production is in the Oxford pool.

Rega Pool Extended

One of the interesting developments of the week came from Trego County where Central Commercial Oil Company appears to have extended the old Rega pool approximately one-half mile to the north in its Wagg 1, NW NW SE 17-13s-21w. This test topped Pennsylvanian basal conglomerate at 3874 feet and was drilled to 3889 feet. At the end of the first 24 hours after reaching the present total depth it had 1300 feet of 34-gravity oil and later the column had built up to 1500 feet. It will be acidized before further testing.

The pool was discovered in May, 1929, when it completed King 1, NE SW NE 20-13s-21w, yielding 284 barrels initially from Pennsylvanian basal conglomerate at 3960 to 3972 feet, the total depth. In August, 1930, the discovery well was deepened to 4094 feet but was plugged back to 3965 feet and recompleted for 286 barrels. In June, 1934, the company drilled King 2, SE SW NE 20-13s-21w, a south offset to the discovery well. This test was carried to 4453 feet and completed as a dry hole after testing Arbuckle lime. Trego County is expected to be one of the areas of considerable activity during coming months.

Stafford Wildcat Abandoned

Herndon Drilling Company and Atlantic Oil Producing Company have abandoned Russell 1, C SE NW 20-21s-14w, northeast of Larned in northwestern Stafford County. Top of the Arbuckle lime was encountered at 3770 feet and the hole drilled to 3792 feet where water was encountered. Saturated lime was recovered in a core between 3784 and 3788 feet. Nearest production is in the Gates pool.

The Silica pool of southeastern Stafford and northwestern Rice counties had three new operations. Bradley Oil Company was digging cellar for No. 4, SE NE NE 32-19s-10w, on the northeast edge of production; as was Stanolind Oil and Gas Company for Mitchell 4, NW NE SW 32-19s-10w. Across the line in Stafford County The Texas Company had staked location for No. 1, NE NE NW 36-19s-11w.

In southwestern Rice County, Robertson Bros., had materials on the ground for School Lot 1, SE SE SE 16-20s-9w. It is located on a one-acre tract. Herndon Drilling Company et al's Smith 1, NE NW SE 16-20s-9w, topped the Arbuckle (Siliceous) lime at 3250 feet, had a showing of oil from 3253 to 3256 feet, the total depth and was shut down on account of bad weather after cementing seven-inch casing at 3250 feet. Both are in the old Beyer area which is now included in the Chase pool.

Stumps Extended South

One-half mile south of the Stumps pool in northwestern Rice County Allison and Fitzwilliams Blake 1, NE NW NW 9-18s-10w, topped Arbuckle (Siliceous) lime at 3257 feet, drilled to 3259 feet and cemented 6⅝-inch casing on bottom. The hole was bailed down before the plugs were drilled and a showing of oil encountered. This indicated a failure in the cementing job and the string was being recemented. The oil is believed to be coming from Kansas City lime. Principal production in the Stumps pool is from Arbuckle.

Reno County Active

Reno County continued as one of the most active of the Kansas areas. In the Yoder pool Derby Oil Company's Schrock 5, SW SW SW 27-24s-5w, topped Kansas City lime at 2695 feet, Mississippi chat at 3389 feet and was running eight-inch casing to 3445 feet where a showing of oil was encountered. One-half mile west of the pool Marathon Oil Company's Bontrager 1, NE NE NE 33-24s-5w, topped Simpson at 3826 feet, Wilcox sand at 3830 feet and encountred water at 3833 feet. At 3855 feet the column of water had increased to 3000 feet and drilling was being continued below 3870 feet to test Arbuckle (Siliceous) lime.

In the Lerado or Langdon pool in the southwestern part of the county, Shell Petroleum Corporation's Reece 2, C NL SW 11-26s-9w, approximately one-quarter mile northeast of the discovery well, had Mississippi lime from 3876 to 3958 feet, topped the Viola lime at 4135 feet and had a showing of oil at 4144 feet. Seven-inch casing was cemented at 4135 feet, 17 feet above the bottom of the hole. The discovery well yielded 878 barrels flowing initially from Viola lime topped at 4128 feet and had first oil at 4137 feet. Helmerich and Payne et al were moving in materials for No. 1, C SE NE 27-26s-5w, a wildcat operation in the southeastern part of the county.

A recent report that the old Watchorn Oil and Gas Company's Morrison 2, C NW NE 20-32s-21w, would be deepened is now said to have been in error. This test, completed as a dry hole in Arbuckle lime in March, 1931, holds the depth record for Kansas at 6906 feet. According to the current report casing will be pulled and some showings in the upper part of the hole tested.

KANSAS
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
BUTLER COUNTY—		..
Pryor & Lockhart, Boucher 1, nw nw nw 19-27s-4e	*	2287
National Ref. Co., McCullough 1, ne ne sw 1-28s-6e	107	3175
COFFEY COUNTY—		
Spencer et al, McLean 1, ce¼ sw se 1-23s-14e	41	1559
COWLEY COUNTY—		
Roth & Farout, Smiley 3, se ne nw 12-32s-4e	*	3515
GREENWOOD COUNTY—		
Tidewater & Great Southern, Stephenson 13, ce½ se sw 2-26s-8e	20	2407
HARVEY COUNTY—		..
Sunray Oil, Dirks 1, cse sw 14-22s-2w	*	3087
Ok-Tex et al, Osborne 1, cse se 6-23s-3w (pb 2875)	*	3679
RENO COUNTY—		
Olson & Shell, Fast 3, cnw ne 25-23s-4w	185	3366
The Texas Co., Collins 1, cne ne 9-24s-4w	¶25	3326
McPherson Drlg. & Derby Oil, Scheuchzer 1, ne se sw 17-24s-4w	¶1-689	3391
RICE COUNTY—		
Slick, Pryor & Lockhart, Volkland 2, ne se ne 5-18s-10w	303	3271
Permian Oil Co., Conner 1, cne ne 28-19s-7w (pb 3210)	*	3640
Bradley Oil, Wendell 2, sw ne ne 32-19s-10w	1143	3294
Marathon Oil, Proffitt 7, ne sw nw 5-20s-9w	1340	3234
Twin Drlg. Co., Burchert 1, sw sw sw 8-20s-10w (otd 3358)	*	3398
RUSSELL COUNTY—		
Phillips & I.T.I.O., Jellison 1, ne ne nw 30-13s-14w	1004	3288
Phillips Pet., Holland 3, ce½ sw sw 13-14s-15w	434	3275
Barnsdall, Karst 1, ne se nw 27-15s-14w	185	3353
STEVENS COUNTY—		
Stevens County O&G, Young 1, csw ¼ 11-34s-39w	¶9½	2753
SUMNER COUNTY—		
Marathon Oil, Markley 1, sw nw se 28-31s-1w	lcn.	abd.
Shawver & Dewar Oil, Barlow 1, nw ne se 33-31s-1w	lcn.	abd.
Shell Pet., Nebitt 1, nw se ne 14-32s-2e (otd 2089) (pb 2951)	288	2964

*Failures; †Junked; ¶Million cu. ft. gas.

WHEELER COUNTY
Wildcat seeks production in Ordovician lime

Pampa, Texas.—Drilling operations have been started by Phillips Petroleum Company's G. W. Porter 1, C NE SW Section 35, Block A-8, H&GN Ry. Survey, Wheeler County wildcat seeking production in the Ordovician lime. It is about two miles northeast of the Shamrock oil and gas field and the same distance down dip from the crest of the buried granite ridge that forms the trap for the accumulation of oil in the Texas Panhandle. Lively scramble for lease and royalty protection occurred in January when it became known that the above company would drill a deep test. Fragments of Ordovician limestone have been found in cores taken near the top of the granite in a few wells in the Shamrock field, according to reports. A decisive test on the Porter tract can be attained by drilling to 6000 feet.

The only previous try for production in the Ordovician series adjacent to the established oil and gas areas in the Panhandle was drilled in 1934, by Phillips Petroleum Company et al on the J. C. Wilson tract, northeastern Moore County. The Ordovician proved barren in drilling to 8013 feet, and the hole was plugged back to 3190 feet to make a gasser in the regular dolomite lime horizon.

Contrary to reports, the Hall County wildcat of Phillips Petroleum Company on the L. M. Hughes ranch will be continued to the Ordovician, its original goal. Drilling was in progress below 7855 feet, logging limestone and chert, late last week. About 100 feet of hole was made during the week. The chert has slowed down the rotary.

Tom F. Hunter, Wichita Falls, et al's R. E. Tinsley 1, NE¼ Section 8, Block 13, H&GN Ry. Survey, semi-wildcat in northeastern Collingsworth County, has been completed with an initial yield of 2,080,000 cubic feet of dry gas, testing 350 pounds rock pressure, after dual shot in lime. The hole was plugged back from 2260 feet to 1980 feet, or 154 feet above sea level.

TEXAS PANHANDLE
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
CARSON COUNTY—		
Texoma Nat'l Gas Co., J. M. McLaughlin 3-M	¶43¼	2567
COLLINGSWORTH COUNTY—		
Tom F. Hunter et al, R. E. Tinsley 1	¶2	2260
GRAY COUNTY—		
Danciger Oil & Refineries, Inc., Morse 10	244	2556
Stanolind et al, A. Waggoner 6	345	3230
HUTCHINSON COUNTY—		
Valley Osage Oil Co., B. F. Jameson 1	230	2888
J. M. Huber Pet. Co., J. F. Weatherly 3	¶11	2690
MOORE COUNTY—		
Anderson-Kerr Drl. Co. et al, W. J. Morton-California 1	¶663¼	3082
Canadian River Gas Co., Lee Bivins 17-A	¶5	3490
WHEELER COUNTY—		
Palmer et al, H. M. Smock 1	¶33	2130
Ben G. Barnett Pet. Corp., J. P. Patterson 1-B	¶10.8	2161

*Failures; †Junked; ¶Million cu. ft. gas.

Sayre Field Extended

FIELD MAY CONNECT WITH SCARBOROUGH AREA

WEEKLY STAFF REPORT

Midland, Texas. — Initial gauge of 567 barrels of pipe line oil was recorded by Amerada Petroleum Corporation's Daugherty 1-A, SEc Section 35, Block 74, P. S. L. Survey, north outpost for the Sayre field, Winkler County, after 180-quart intro shot in sandy lime at 2820-2945 feet. The hole is bottomed at a sub-sea depth of 46 feet. Eventual linking of this field with the Scarborough field, two miles to the north, is now in porspect. Humble Oil & Refining Company and Tide Water Oil Company's J. B. Walton 1-D, an intermediate location, is drilling below 2300 feet, with an elevation of 2907 feet.. Magnolia Petroleum Company's Walton 3, NWc NE Section 19, Block 74, nearest producer in the Scarborough field, cleaned out bridge at 2855 feet and flowed 347 barrels oil in 24 hours. It was completed in 1934 as a gasser with small volume of oil in sandy lime at 3063 feet, or 139 feet below sea level, and has not been shot.

The Texas Company's Daugherty 1, SWc Section 2, Block 74, located about one mile west of production in the Scarborough field, developed hole full of water in drilling to 3300 feet, or 400 feet below sea level. Operations have been suspended. Streaks of sand and sandy lime, showing oil, were logged below 3058 feet.

Two members of the drilling crew and well shooter engaged in lowering 350 quarts of nitro in Gulf Oil Corporation's Daugherty 2, southeast outpost location for the Sayre field, escaped with minor injuries when shell went off prematurely near bottom of the hole and blew a 30-quart shell into the top of the derrick, where it exploded. The production increased to 600 barrels oil and 4,000,000 cubic feet of gas daily, according to estimates and was on fire February 20. The well was drilled to 3000 feet, 136 feet below sea level.

Gulf Oil Corporation's Keystone 10, NEc SE Section 10, Block B-3, P. S. L. Survey, an inside location for the Keystone field, Winkler County, produced 1282 barrels of 33.9 gravity oil and 11,649,000 cubic feet of gas during first 24 hours after 400-quart nitro shot in lime at 3330-3513 feet, having plugged back from sulphur water at 3576 feet to 3533 feet. Later gauge credited the well with flowing 765 barrels of oil and 18 barrels water with gas volume unchanged, while cleaning out cavings at 3350 feet. The company is rigging up to drill Keystone 12, NEc Section 10, being a south offset to Richardson Oils, Inc.'s Walton 3.

In Concho County, Maverick Oil Company's Jim Rice 1, SWc NW¼ Section 18. Indianola Ry. Co. Survey, A-1413, is rated good for 500,000 cubic feet of gas daily from sand at 1827-1829 feet, with an elevation of 1887 feet. Phil Maverick, San Angelo, president of the company and a geologist, has announced that the wildcat will be deepened. It is in the southeastern portion of the county and about four miles northwest of Melvin. Except for a small gasser completed in 1927 from the 1100-foot sand the county has failed to produce.

Progress on W. T. Walsh, Harry Adams Corporation et al's Averitt 1, located on the Seminole structure, Gaines County, has again been checked by the loss of two strings of tools at 3940 feet. Cavings prevented recovery of the junk by finishing, and an effort will be made to drill by. In the northwest portion of the county, E. M. Wahlenmaier and York & Harper, Inc.'s Jones 1 was drilling in dolomite lime at 5114 feet.

Cardinal Oil Company's White-Baker (Gulf) 1, SE¼ Section 44, Block Z, HE&WT Ry. Survey, Pecos County semi-wildcat, was drilling in gray lime at 1750 feet, with gas flow estimated at 15,000,000 cubic feet daily from series of pays in sandy lime between 1661 and 1717 feet.

Humble Oil & Refining Company has erected rotary rig to drill 1½ miles northwest of nearest production in the Means field, north central Andrews County. Location is on the J. M. Spinks 240-acre lease, near C SW SE Section 13, Block A-20, P. S. L. Survey. Development of this large producing structure, which was proved in August, 1934, by this concern's first test, has been conservative. Humble Oil & Refining Company has completed six oil producers on its R. M. Means 4273-acre lease, and operations are underway on the seventh test for its J. S. Means 17,000-acre leasehold. Shell Petroleum Corporation and Sun Oil Company, the only outside interests participating, have each completed a single flowing well in the 4400-foot dolomite lime. Gas produced with the oil by the latter company's well is virtually noninflammable, and is not suitable for gas engine fuel.

Drilling has been resumed on Wm. H. Dunning, Jr. et al's Clarence Scharbauer 1, SEc SW Section 33, Block 44, T-1-N, T&P Ry. Survey, an intermediate test for the north and south portions of the Goldsmith field, Ector County, after several weeks spent in lubricating off 30,000,000 cubic feet of high pressure gas production in lime at 4058 feet. Top of gray lime was logged at 3725 feet with an elevation of 3159 feet. In the event of a prolific oil producer, this test caused the drilling of a number of projected locations on leases held by independents immediately north of Gulf Oil Corporation's big leasehold.

WEST TEXAS
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
CRANE COUNTY (Waddell Field)—		
Gulf, M. F. Henderson 3	5544	3534
ECTOR COUNTY (Judkins Field)—		
Simms Oil Co.-Phillips Pet. Co., University 5	505	3690
FISHER COUNTY—		
Southern Oil Corp., Scott-Pardue 3	840	3121
HOWARD COUNTY—		
Conoco-Group 1 Oil Corp., Overton 9	1440	2400
PECOS COUNTY (Pecos Valley Pool)—		
Kone Prod. Co., Pecos Valley Oil Co. 2	75	1575
PECOS COUNTY (Torborg Pool)—		
Stanolind, Tippett 14-B	193	444
UPTON COUNTY—		
Gulf, J. T. McElroy 126	759	2880
J. T. McElroy 127	277	2917
J. H. Shirk 5-E	92	2546
G. R. Thomas & Burk, Robbins 1	300	2141
TP Coal & Oil Co., J. F. Lane 8-C	729	2330
WARD COUNTY—		
California Co., York 21	477	2537
Dobbs Oil Co., A. F. Bray-Gulf 1	163	2562
Jess Gibson et al, Owen-Sloan 1	202	2345
Gulf, O'Brien 65	426	2781
Richardson Oils, Inc., Johnson-Sun 25-B	1641	2585
WINKLER COUNTY (Halley Pool)—		
Emperor Oil Co., Woodley-Halley 1	680	3087
WINKLER COUNTY (Keystone Field)—		
Gulf, Keystone 10	¶11½	1282 3576
WINKLER COUNTY (Sayre Field)—		
Empire G. & F. Co., Daugherty 2-A	524	3036
Humble, J. F. Howe 1	1178	2985
Joe C. Maxwell & Atlantic, Daugherty 7	976	3014

*Failures; †Junked; ¶Million cu. ft. gas.

NORTH TEXAS
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
ARCHER COUNTY—		
L. T. Burns et al, Turbeville 17, blk 152	45	1514
W. L. Hawkins et al, W. R. Pace 5, blk 112	10	1206
Pet. Producers Co., Richardson 15-D, blk 1	30	1258
The Texas Co., Pearston 2, blk 120	*	1492
BAYLOR COUNTY—		
Consolidated Oil Co., Portwood 17-R, sec 1570	478	1350
COOKE COUNTY—		
Hudspeth et al, Truebenbauch 2-B	9	891
F. W. Merrick, Inc., Knabe 22, blk 6	12	812
McCollum 1	*	1378
Mudge Oil Co., Clayton 4	*	1155
Pace Pet. Co., Aldridge 5	55	1154
Vindicator Pet. Co., Walterscheid 4	15	805
HASKELL COUNTY—		
Anderson-Kerr Drl. Co., J. F. Ivey 1, sec 2	†	1810
JACK COUNTY—		
Engineers Oil Prop. Corp., Shanafelt 2	75	3017
WICHITA COUNTY—		
Fred W. Boardman et al, J. L. Jackson 1, blk 28	*	721
R. R. Clark et al, Bickley 40	*	1050
Geo. W. Cooper et al, Waggoner Bros. 32	10	1437
The Texas Co., Waggoner Est. 422, sec 148	20	1108
Waggoner Ref. Co., Waggoner 4-AA, sec 148	15	783
WILBARGER COUNTY—		
Deep Oil Dev. Co., Waggoner Est. 1, sec 40	35	1875
Texas State Oil Co., Shipley 2	*	2001
YOUNG COUNTY—		
Alexander & Beavers, G. B. Hamilton 1, sec 3401	200	905
L. T. Burns et al, R. O. Andrews 3, sec 1399	25	920
Duncan et al, S. M. J. Benson 2, sec 1391	75	907
D. S. Johnson et al, E. E. Hall 7	5	695
Rathke Oil Co., Wadley 2	178	3828
Underwood Drl. Co. & Campbell, Campbell 8-A, sec 1376	175	897

*Failures; †Junked; ¶Million cu. ft. gas.

Leasing Subsides

CLOUDED LAND TITLES DELAY TITUS COUNTY TRINITY TEST

WEEKLY STAFF REPORT

Tyler, Texas.—Title difficulties confronted by Housh & Thompson, Inc., and R. L. Peveto, owners of the northwestern Titus County wildcat that showed favorable for commercial oil production in the Paluxy or upper Trinity sand series February 7, have caused postponing a production test indefinitely. In the meantime a new test is starting up about three miles to the west by south on a short term lease. Companies and individuals that participated in the spectacular lease and royalty play along the entire path of the Mexia fault zone immediately after the wildcat registered favorably on drill stem test likewise have considerable title defects to be ironed out. Trading has subsided to a negligible volume as all desirable acreage adjacent to the projected fault line has been bought in at abnormally high prices.

The deep test in Titus County is located near the northwest corner of the C. M. Carr 108½-acre lease, M. V. Delgado Survey, about one and one quarter miles due east of Talco. The Paluxy zone began showing oil with rotary returns while drilling near the 4190-foot level. Core was taken at 4205-4208 feet, showing clean sand saturated with oil. First three attempts with open hole formation tester failed, but the fourth yielded 800 feet of dark oil, estimaated between 27 and 30 gravity, in drill pipe through three eighths-inch openings at the bottom and top within 23 minutes. A string of 8¼-inch casing has since been cemented at 4166 feet, and tested. The drilling of cement plugs and installation of tubing for a production test awaits the settlement of claims filed by a Fort Worth attorney representing two distant heirs who were overlooked when the lease was signed. Other outside litigation has also appeared.

W. C. Windsor, Tyler operator and veteran of past wildcat campaigns in East and Central East Texas, is starting a test on the Hughes & King tract, Orlander James Survey, about two miles southwest of Talco and on the east line of Franklin County. Location is on a short term lease, thus necessitating an early completion, as a new lease at current values in this immediate area would cost more than a completed well.

Fast Work

Normally conservative companies and individuals staged the fastest lease and royalty play during the first three days after the Talco structure test that has ever been sprung in an extended stretch of territory. Buying centered upon the Mexia fault zone, extending east by north across Texas into Arkansas from the Talco location. Active buying and high prices prevailed along this fault to the west and southwest across Franklin, Hopkins, Hunt, Kaufman, Henderson, Navarro and Limestone counties. The activity subsided below Kosse, in the latter county.

Approximately 250 miles of faulted territory was swept by the lease and buyers, averaging about two miles in width along the projected line of the main Balcones fault. Only a few of the early arrivals picked up protection at $1 per acre, and it is estimated that the average cash bonus paid and contracted for amounts to about $5 per acre. Many trades were made on secondary, or parallel faults. Between $1,750,000 and $2,000,000 was expended for leases and royalties up and down the fault trend within three days after the potential oil strike became known.

Companies that have maintained up-to-date geological information and general well data on the fault zone were the best equipped to act promptly in acquiring mineral interests, and to eliminate unwarranted expenditures through lack of knowledge of the territory. A number of large companies were caught unprepared, and found it impossible to compile the needed data to guide lease buyers in time to participate in the buying rush.

The Mexia fault zone has experienced a number of lease buying campaigns along the same course now holding the spotlight, but heretofore the Woodbine sand zone has been the basis of the activity. No production has been found in the Woodbine along this fault to the north of the Corsicana-Powell field, although the Bazette structure, Navarro County, looked promising with its numerous gas showings. Land owners became educated on values in former years and were set to cash in on their new opportunity. Divided mineral interests, with the address of many of the owner's not available will cloud the title to a high percentage of the tracts leased.

Competition for lease and royalty protection was intensified by the fact that many independent producers in the East Texas field have prospered and were eager to take part in a new play. Prices were bid up to levels ordinarily considered prohibitive for remotely located wildcat protection due to so many buyers concentrating upon the long narrow stretch.

Drilling to Follow

Only a few drilling blocks were obtained in the lease buying spree, and the majority of these were taken by majors that plan to defer exploration work until more specific information is available on the importance of the Trinity series as a source of production along the Mexia fault. Costs involved in making a decisive test of the Trinity

EAST TEXAS
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
JOINER AREA—		
Allsman & Apple, Propes 2 (15-ac)..	500	3704
Arcadia Ref. Co., Gilstrap 2 (5-ac)..	350	3639
Nick Barbare et al, Propes 1 (15-ac)	160	3555
Chalk & Slaughter, Frederick 5-A (26.3-ac)	500	3620
E. Constantin & Co., Carey 2 (11.07-ac)	145	3589
Watkins 4 (130-ac)	60	3639
Watkins 6 (130-ac)	60	3667
Davis-Smith-Barclay, Bradford 1 (2½-ac)	80	3670
Droppleman Drl. Co., Cox 9 (60-ac)	8000	3705
Drury-Meeks Corp., Cole 1-B (89-ac)	7000	3838
W. H. Gant-Garvin-Wegener, Strickland 5 (154½-ac)	120	3693
Gulf, Grisham 15 (99.84-ac)	7500	3748
Humble, DeGuerin 19 (134.3-ac)	3500	3739
Wooley 7 (55-ac)	8500	3759
Hunt Prod. Co., Reid 14 (120-ac)..	250	3665
Mabee Cons'ld Corp., Maxwell 1-D (10-ac)	160	3613
Magnolia, Wright 35 (78.1-ac)	8000	3685
Alex McCutchin et al, Rutledge-McKinney 1 (7.38-ac)	5000	3703
C. L. McMahon et al, Finney 4 (22-ac)	600	3672
Octo Oil Corp., Marvill 2	†	3619
Sells Pet., Inc., St. Clair 7 (84.83-ac)	7200	3550
Sinclair Prairie, Mayfield 52-A (374.74-ac)	1000	3813
Sun, Dorsey 2 (72.78-ac)	175	3605
Schuyler-Schuyler 6-A (50-ac)	2500	3663
Texas Co., Price 9 (90-ac)	5000	3636
Wynne et al, Rettig 1	*	3720
KILGORE AREA—		
American-Liberty Oil Co., Sabine River 21, Tr 5	3500	3550
Arkansas F. O. Co., Hughey-Ross 31 (220-ac)	7000	3562
Jules Constantin et al, Elder 2 (25-ac)	360	3504
O. R. Cooper et al, Compton-Thompson 3 (1.43-ac)	6500	3540
Gralenor Oil Co., King 8 (78.33-ac)	1000	3688
Houston Oil Co., Wells 4 (25-ac)..	5500	3738
Hurtle Oil Co., Williams 11-B (142-ac)	750	3623
Magnolia, Bean 14 (101.82-ac)	1000	3610
Laird-Crim 8 (54.51-ac)	8600	3577
Neversuch Oil Co.-Magnolia, Givens 12 (22.67-ac)	7500	3652
Y.. Rogers & Rozel Oil Corp., Still 6 (92-ac)	240	3522
Shell, Watson 59 (385.2-ac)	9200	3576
Sinclair Prairie, King 49-A (366.7-ac)	7000	3510
Stanolind, Christian 7 (50-ac)	9000	3655
LONGVIEW AREA—		
Arkansas F. O. Co., Hestland 8 (36.7-ac)	8000	3631
Walker 4 (22.65-ac)	8500	3640
H. W. Clarkson et al, O'Byrne 6 (46-ac)	2000	3648
Day & Co., Victory 3 (40-ac)	5500	3672
Humble, Mackey 23 (198½-ac)	500	3600
O'Byrne 12-B (104.2-ac)	5500	3666
Independent Supply Co.-T. P. Looney, Shelton 3 (15.85-ac)	7000	3713
Simms Oil Co., Wood 4 (116-ac)	35	3586
Stanolind, Jones 13 (83.23-ac)	7000	3548
Stanolind-Simms, Akin 14 (80-ac)..	8400	3604
O. J. Albright 11 (90.6-ac)	9000	3629
ANDERSON COUNTY (Cayuga Field)—		
Tide Water & Seaboard Oil Corp., J. N. Edens 13 (988.6-ac)	2000	4089
HENDERSON COUNTY (Cayuga Field)—		
Earl P. Corley et al, C. L. Loper-Conoco 1	2500	4096
WOOD COUNTY—		
Gulf Oil Corp., C. D. McCollum 1..	*	5200

*Failures; †Junked; ¶Million cu. ft. gas.

series will have a tendency to restrict the number of independents capable of forming an acreage pooling agreement for the purpose of drilling. In the event of a successful completion resulting from the Talco project a wildcat will likely be started in western Franklin County and in the A. O. Wetmore Survey, Hopkins County, as Woodbine failures have outlined attractive faulted structures in each area. The Quinlan area, Hunt County, is also in line for a test on acreage held by Ed. Hyde and W. A. Moncrief. Renewal of the protracted search for deep production near Kosse is to result from block recently assembled by Ramsey Petroleum Company of Oklahoma.

Drilling is in progress below 3150 feet on C. F. Lytle et al's Thompson 1-T, projected Trinity test on the west edge of the Mexia field. The oolitic lime section of the lower Glen Rose has given ample encouragement for deep production in former tests at Mexia.

UNDER WATER

Tyler, Texas.—Second oil producing horizon immediately below the water level in the Woodbine has been uncovered by Stanolind Oil & Gas Company and The Falcon Company's Flake Williams 2-A, located on 17.24-acre lease, Wm. Goodwin Survey, near the northwest corner of the East Texas field and about one mile north of Gladewater. Under somewhat similar conditions a flowing oil producer recently was completed near the southwest edge of production in the Joiner area, Rusk County. A number of commerical wells have been completed on the extreme north end of the East Texas structure from a lower sand body that is below the water table for the main section of the field, but the oil production is not attractive as that found in the regular pay zone.

Placedo Extension

MECHANICAL TROUBLE WITH SEADRIFT TEST

SOUTH TEXAS

WEEKLY STAFF REPORT

Corpus Christi.—A one mile west extension to the Placedo field, Victoria County, more extensions at Saxet Heights in Nueces County, failure of the key wildcat in the Taft area, San Patricio County, were developments in the Corpus Christi district.

Gillespie and Superior Oil Company's Henderson & Pickering 1-B, in the southwest corner of Block 93, SA& MG. Ry Survey, flowed 15 barrels of oil per hour through one-fourth inch choke, showing a tubing pressure of 400 pounds with casing sealed. The well had a series of sands from 4731 to 4780 feet, the upper part showing gas. Casing was landed at 4777 feet.

Efforts were being made late last week to control E. L. Smith and Gulf Oil Corporation's Wright 2, which blew out after drilling to 6058 feet. It was making a large volume of gas and salt water along with some sand and mud. The well originally attempted completion at 4768 feet.

This producer brought additional territory into the play and an extensive development campaign is assured for the new district. Deep drilling also is increasing in the area, two wells making hole below 5500 feet and a third below 6000 feet.

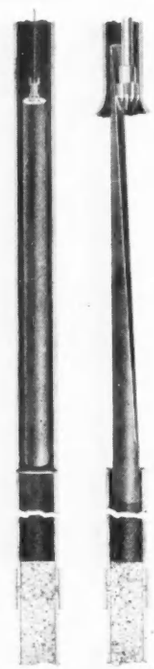
Continental Oil Company is having serious mechanical trouble in American National Realty Company (Moody) 2-A, 10 miles southeast of Seadrift, Calhoun County, after drilling to 9083 feet, landing 5¾-inch casing and successfully cementing it on bottom. The well was drilled to this level from 8023 feet in a few days, and for a time it looked as if all of the hole could be saved. The shale heaved and filled the hole about 800 feet, but the old bottom was reached and the casing run and cemented. The 5¾-inch casing parted immediately below the 8⅝-inch string at 8023 feet and the well again fell into the doubtful classification. An effort is being made to correct the mechanical difficulties. The shale strata below 8023 feet carried gas and some oil.

Humble Oil & Refining Company's Goodwin 1, north offset to the discovery well in the Taft field was drilling at 6255 feet showing only a series of salt water sands. Heep Oil Corporation's Svedlenak 1, 1½ miles south of the discovery well, was coring at 5035 feet without having encountered any shows. George E. Smith's J. L. Britton 2, east offset to the discovery well is coring at 4950 feet. These failures place a damper on a leasing play which followed the discovery of this Greta sand production.

The deepest well thus far drilled in the Plymouth field has been abandoned. It is Sun Oil Company's Edgar 2, which was stopped at 7030 feet. The field has two new producers, both in the 5600-foot sand and both by the Plymouth Oil Company.

A key location for the county is Benedum and Trees' Mrs. E. H. Welder 2, Section 19, located three and one-half miles northeast of Sinton and one and one-half miles northwest of the original test drilled by these operators. Contract has been let Rowan and Hope for Willis Storm et al's Hobbs 1-A, located one mile southeast of Mathis. It is a 7000-foot job.

A series of minor extensions were effected in the Saxet Heights field, Nueces County, where tests only one or two locations from the producing limits were completed. Some excellent wells have been recorded on late completions. One mile southeast of the field, Refugio Refining Company's Weil 1, has been shut down at 4500 feet. It has not been announced whether or not it will be deepened. Several



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other wells have been started on outpost locations.

A 3500-foot northeast extension to the field seemed likely late in the week with D. H. Hawn's William Shely 1, 3500 feet northeast of production topping the gas sand at 4045 feet and coring ahead.

The Hawn well topped the oil sand at 4063 feet and went ahead to 4090 feet. A drill stem test at 4068-90 feet showing 2650 feet of oil and one joint of water along with 15 pounds pressure in 13 minutes. It is reaming down to take another test before setting casing.

A series of twin wells in the Clarkwood area of the Saxet field also are in prospect with several overlapping sand lenses showing for production. This small tract area is the center of a hot development campaign.

Quintana Petroleum Corporation has staked an important wildcat in Refugio County, being Fannie Heard 1, 475 feet from the south line and 2296 feet from the west line of the Thomas Webb survey. The well is one mile north of the Tomoconnor field and several miles east of the Greta production. It will attempt to extend the field to the north.

The Tomoconnor production and east flank development in the deep sand at Greta field are becoming closely connected. Quintana Petroleum Corporation has completed 30 wells to the 5800 foot sand in this area and several other companies have been successful with operations on the east side of Greta. Hewitt and Daugherty's Lambert 21, block 23, Hardwick survey, cored oil sand at 5780-92 feet, shaley sand at 5814-15 feet and oil sand at 5842-60 feet and set casing. Plugs are being drilled.

GOVT. WELLS LINE

Will have outlet for crude at Corpus Christi

San Antonio.—First crude runs have made through the initial unit of the Crude Oil Pipe Line Company's pipe line from the Government Wells district in Duval County to Corpus Christi. The completed section is 25 miles long from the Loma Novia field of Duval County to San Diego, in the eastern portion of the same county where the oil is being loaded into railroad tank cars for delivery at Corpus Christi.

Surveying is being completed and right-of-way is being secured for the 50 miles of the project from San Diego to Corpus Christi. The work will be commenced on the second unit immediately with completion anticipated by April 1.

The pipe line is 5½-inch with a daily capacity of 10,000 barrels. All equipment is new and standard type. A Diesel power pumping plant has been constructed in the northwest quarter of Section 77 in Duval County. Storage facilities, pumping plant and loading racks have been constructed at San Diego on the Texas Mexican railroad, which also extends to Corpus Christi

The line from San Diego will follow the general line of the railroad and will terminate near the Corpus Christi ship channel, where a terminal will be erected to be operated by the same interests. The plant at Corpus Christi is to be completed at about the same time as the pipe line.

Oil will be marketed at Corpus Christi by the Crude Oil Marketing and Trading Company, a corporation recently organized. Incorporators H. A. Ellis, E. L. Buckley and Curg Lucy.

Construction of the line has been given to N. A. Saigh Construction Company of San Antonio.

It is understood that further expansions to the line are contemplated, including feeder lines to several fields.

MERCEDES EXTENDED

McAllen.—Establishment of a shallower producing horizon and extension of the Mercedes field, Hidalgo County, 4000 feet to the east featured activity in the Rio Grande Valley District during the week.

Union Sulphur Company's American Rio Grande Land and Irrigation Company 1, located one and one quarter miles northwest of the discovery well, cut out liner to 6800 feet, and the well started flowing about 2,500,000 cubic feet of gas and 47 gravity oil through ¾-inch choke, showing 400 pounds pressure on casing and tubing.

The production heretofore has been between 7450 feet and 7500 feet.

Same company's Well 7, Tract 2309, Block 59, 4000 feet east of production, cored several sands in the 7500-foot sector. It is now coring below 7555 feet. Same company's well 8, just north of production, is down 5600 feet.

One mile south of the Mestenas field, Gulf States Oil Company's Delta Orchards 1, is drilling at 5465 feet. Quintana Petroleum Company's Engelman 1, three miles still farther southeast, is down 3250 feet.

FAULT ZONE ACTIVE

Austin chalk objective in Pearsall district

San Antonio.—Balcones Fault zone district regained the spotlight of South Texas last week as several wildcats proved productive. It apparently is the beginning of a new development campaign for the territory which has been dormant for the past several years.

The new Pearsall district of Frio County is the center of interest with a two and three quarter-mile southwest extension to the deep area virtually proven and seven wells drilling to the 5300-foot Austin chalk horizon, doubling the activity of one week ago.

Amerada Petroleum Corporation's Cory and McWilliams 1, Block 13, Section 298, is bottomed at 5569 feet with casing set at 5420 feet. After the swab had been run several times, the line broke and repairs were made later in the week. It showed an amount of oil to indicate that it would develop into a producer. In addition to being a long extension to the field, it will be the second producer in the Austin chalk. One other producer at 5927 feet is in the Buda limestone.

Fourth deep producer for the southwestern extension of the field was in the making with Amerada Petroleum Corporation's Halff and Oppenheimer 6, Section No. 355, drilling to 5362 feet and setting casing. Number 6 on the same lease, but in Section 1104, is drilling at 5175 feet.

The company was rigging up on three more wells. McWilliams, Section 299,

SOUTH TEXAS

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
DUVAL COUNTY—		
Gilcrease & Gravis, J. W. Byland 5, blk 3, sec 78 (Loma Novia)	750	2587
Highland Oil Co., M. C. Hubbard 26, sec 72 (Loma Novia)	900	2617
Humble, M. C. Hubbard 2-B, sec 83, (Loma Novia)	450	2779
Magnolia, Brennan Benavides 32, blk 397, Hale sub, Arispe gr (Cole)	475	2784
Duval County Ranch 7, sec 100 (Piedra Lumbre)	150	1965
C. W. Hahl 13, sec 67 (Loma Novia)	600	2590
C. W. Hahl 20, sec 67 (Loma Novia)	750	2623
Reynosa Oil Co., R. P. McLean 2-A, sec 62 (Loma Novia)	75	2574
Santa Clara Oil Co. (Atkins & O'Neil), J. F. Welder 17, sec 383 (Seven Sisters)	750	2469
Santa Clara Oil Co. & Henderson, J. F. Welder Heirs 8-C, sec 381 (Seven Sisters)	750	2405
Smith & Hamill, M. C. Hubbard 17, sec 77 (Loma Novia)	750	2694
Texas Co., M. Vela 21, sec 42 (Loma Novia)	550	2722
H. Wendt 15, sec 68 (Loma Novia)	100	2791
H. Wendt 19, sec 68 (Loma Novia)	380	2710
Valley Osage Oil Co., L. B. Moody 1, sec 60 (Loma Novia)	350	2566
Westheimer & Daube, Z. Campos 3, sec 224 (Seven Sisters)	250	2233
GUADALUPE COUNTY—		
O. W. Killam, Reneker 1, G. Chatwell sur	*	1213
Kniffin & Gallagher (Stagal), Lay 2, J. K. Davis sur (S. Darst Creek)	400	2497
HIDALGO COUNTY—		
Navarro Oil Co., F. B. Guerra 2, sh 12, por 41 (Samfordyce)	400	2770
JIM WELLS COUNTY—		
G. M. Richardson, J. E. Garrett 1, 1980 ft sl, 1640 ft el sec 5, N. G. Collins gr.	*	lcn.
KLEBERG COUNTY—		
John Bartlett, Anton Dietz 1, blk 16, sec 48, KT&I sur (Kingsville)	*	3010
LEE COUNTY—		
Mills et al, Batey 1, 330 ft sl, 2540 ft wl of W. Nichols sur	*	3365
MCMULLEN COUNTY—		
Luray Oil Co., Glass 8, Garner & Hely surs (Calliham) pb 720	20	1070
NUECES COUNTY—		
Magnolia Pet. Co., J. C. Baldwin 8, BS&F sur No. 165 (Baldwin)	942	3879
Republic Natl. Gas Co., Baldwin et al 2, blk 20, Russell Farm Lots (Saxet Heights)	1250	4085
Westgate Oil Co., Lynch et al 1, Villareal sur (Saxet Heights)	350	4084
REFUGIO COUNTY—		
United Prod. Co., W. J. Fox 16, Hews & Brown sur (Fox) wo, pb & perf csg 5876-81, former td 5934	400	5934
SAN PATRICIO COUNTY—		
Magnolia, Corpus Christi Bank 4, sec 34, Taft Lands (Plymouth)	*	lcn.
Plymouth Oil Co., E. H. Welder 31-C, sec 71, Welder sub (Plymouth)	500	5638
E. H. Welder 32-C, sec 49, Welder sub (Plymouth)	500	5488
STARR COUNTY—		
Barnsdall & Phillips, Yturria 6, por 100 (Samfordyce)	500	2832
VICTORIA COUNTY—		
Gillespie & Superior, Henderson & Pickering 1-B, blk 93, SA&MG Ry sur (1 mi w Placedo field)	400	4780
WEBB COUNTY—		
Mills Bennett, M. L. Lopez 5, sec 112 (Lopez)	500	2228
Montour Prod. Co., M. L. Lopez 4, sec 112 (Lopez)	500	2222
G. G. Mortimer, M. L. Lopez 2, sec 112 (Lopez)	500	2232
Mauricio Lopez 9, sec 73 (Lopez)	450	2175
ZAPATA COUNTY—		
Nash & Clover Oil & Gas Co., Alice P. Haynes 7, blk 7, Haynes sub, Comitas gr (Comitas)	35	875

*Failures; †Junked; ¶Million cu. ft. gas.

three quarters of a mile northeast of the southwest extension test; McWilliams Tract 6, Section 298, north offset to the southwest extension well; and McWilliams and Tijerina, Tract 17, Section 300, two thirds of a mile northeast of the Cory and McWilliams.

In the same district, one mile west of the 3900-foot Navarro sand production, Thornton Davis et al's Halff and Oppenheimer 1, Section 336, swabbed at the rate of 20 barrels of oil and 125 barrels of salt water per day at 4022-33 feet and is going ahead to the lower sands.

Joe Deupree's William H. Russell 1, wildcat seven miles south of San Antonio in Bexar County, was in final stages of completion late in the week. Tubing had been run and preparations were being made for a production test. The well drilled to 1075 feet in the Taylor marl, set casing at 989 feet and treated with 500 gallons of acid. The well has been flowing a little oil by heads but likely will be put on pump for final completion. The oil ranges from 16 to 20 gravity.

The remainder of the fault line showed little interest. A new wildcatting campaign is being started in Zavalla County in an effort to establish further production along the Pearsall trend. In Guadalupe, Caldwell and other counties to the north, a number of operations are being directed to the Austin chalk and above in the older producing areas.

NEW MIRANDO FIELDS

Webb County wells are showing oil

Laredo.—A new Mirando district field is indicated with South Texas Oil Company's Fee 1 near completion in sand at 1729-42 feet. The well is in the northwest corner of Block 21, Section 768, and is one and one half miles southwest of oil production in the Laurel field which produces about 500 feet deeper. The sand evidently is the Mirando series of Jackson age.

The second key wildcat for Webb County is Superior Oil Company's A. S. Billings 1, section 7, one mile west of Lopez field production. The well drilled to 3420 feet, ran electric formation tester, plugged back and set casing at 2330 feet. The Billings test was perforated at 2246-51 feet in a sand topped at 2247 feet and completed as a gasser estimated at 15,000,000 cubic feet per day. Along with a spray of oil, it has a pressure of 275 pounds on tubing and 300 pounds on casing.

The completion of this well will place the Lopez field in first position in Webb County from a development standpoint. It is defined by only two wells and possibly will cover considerable more acreage than already drilled.

With additional pipe line facilities assured, there is little doubt that the present development campaign in the Loma Novia district will continue. This field provided 11 new producers during the week, an average which has been maintained for several months.

Gulf Coast Is Active

TESTING DISCOVERY WELLS IN NEW FIELDS CONTINUES

WEEKLY STAFF REPORT

Houston.—The Texas sector of the Gulf Coast witnessed a dull week in wildcat and field development and was without outstanding developments in any one particular area. The exciting type of news for this district has tapered off since the discovery of Amelia in Jefferson County. Interest is now centered on the outpost tests now drilling in that area.

A potential test was made on Humble Oil & Refining Company's Langham 1, the discovery well, during the past week, and it produced 476 barrels of 28.5 gravity pipe line oil in 24 hours through a quarter-inch choke with a tubing pressure of 675 pounds and casing pressure 1000 pounds. The gas/oil ration was 289 to 1. The discovery well is located in the C. Williams Survey and is only four miles west of Beaumont. Humble Pipe Line Company has laid a four-inch line south, and it ties into the company's eight-inch line which runs to Liberty and then to the Baytown refinery.

More than two miles northwest of the discovery well, Glenn H. McCarthy's Longe 1, H. Williams Survey, was drilling ahead below 4602 feet in shale and is reported to be looking favorable, although the well is not yet deep enough to determine the possibilities just yet. The coming week the operators will have some geological markers which should give some indications as to the structural trend.

Humble Oil & Refining Company's Broussard 1, east of the discovery well, C. Williams Survey, was 1289 feet in shale at the end of the week. The hole was originally drilled to 2053 feet, but while reaming at 500 feet the lower section of the hole was sidetracked.

Salt Water Sand at Turtle Bay

After several attempts to complete Stanolind Oil & Gas Company's Cooper 1, east offset to the discovery well in the Turtle Bay field, Chambers County, and finding salt water in the oil, it was decided to carry the well five feet deeper to find out if the salt water was entering from below. The hole was carried down to 6630 feet from 6625 feet and it was found that the last five feet cored was salt water sand. The hole has been plugged back to 6611 feet and at the end of the week the operators were waiting on cement to set at that depth. The well was given a production test the previous week and the operators swabbed 369 barrels per day through a quarter-inch choke, which showed 30 percent salt water. It was then that the well was carried deeper. Several attempts were made to complete the test and each time the well showed salt water.

Since reporting last week that three producers in the Anahuac field, Chambers County, were flowing into burning pits, gauges have been received from the wells and they are as follows: Clark 8, Section 57 of the H. & T. C. Survey, 30 barrels per hour through a quarter-inch choke with a tubing pressure of 790 pounds and casing pressure of 1040 pounds. The gas/oil ratio was 401 to 1. The well was completed at 7083 feet. W. C. Tyrell 3, H. & T. C. Survey, Section 52, was completed at 7094 feet, flowing 28 barrels per hour through a quarter-inch choke with a tubing pressure of 975 pounds. The gas/oil ratio was 651 to 1. The oil tested 34.3 gravity. Humble Oil & Refining Company's Zappe 3, H. & T. C. Survey, Section 51, made 27 barrels per hour of 34.6 gravity oil through a quarter-inch choke, with a tubing pressure of 1025 pounds and casing pressure of 1050 pounds. The gas/oil ratio was 482 to 1.

Wildcat Cores Salt Water Sand

On the Burnett Bay prospect in Harris County, Cockburn Oil Corporation and Shell Petroleum Corporation's T. W. Thompkins 1, N. Lynch Survey, was drilling in shale at 5860 feet at the end of the week, after coring salt water sand at 5398 to 5414 feet and 5531 feet. The well topped the Discorbis at 4816 feet and the Heterostegina at 5080 feet.

Texas Gulf Producing Company's Westmoreland 1, on the Bellaire prospect, Harris County, was abandoned at the end of the week at 9111 feet, establishing a new record depth for wildcats drilled in Harris County. The well was drilled to the above depth without showing any signs of oil or gas and was carried down for geological information. The well topped the Discorbis at 4232 feet, Heterostegina at 4384 feet, Frio at 4554 feet, Warreni at 6350 feet, Hockleyensis at 7331 feet, Dibollensis at 7450 feet, and Cockfield at 8990 feet.

In the Dickinson field, Galveston County, Humble Oil & Refining Company's Maco Stewart A-6, J. Sellers Survey, was abandoned at 7148 feet after drilling to 9142 feet and plugging back and making a series of drill stem tests. The well was spudded in and drilled to 7184 feet, and set 9⅝-inch casing at 7170 feet. The hole was drilled to 8240 feet in the Frio forma-

tion, a number of drill stem tests were made and the hole was found to be off 11 degrees. It was plugged back to 7300 feet. At 8238 feet a drill stem test was made which failed to show anything. A number of drill stem tests were made down to 9142 feet, showing gas and salt water. Casing was set and the hole was perforated at different levels. It is believed that this well has had more perforations made in the casing than any other well in the Gulf Coast. The casing was perforated from 8775 to 7140 feet. If one perforation at a prospective productive level showed salt water, it was then plugged back to another level and the casing was perforated again. This was continued until the hole was finally abandoned at 7140 feet after swabbing salt water.

With this failure it does not define the field on the southern side, as it is believed that the well is in a fault zone and with the drilling of Maco Stewart A-5, which is still south of Maco Stewart A-6, should give some indications as to the possible limits of the field in this area. Southwest of these wells Coast Petroleum Corporation is receiving production at around the same producing level as the Dickinson field.

Humble Oil & Refining Company's Maco Stewart B-3 perforated casing with 20 holes from 8445 to 8464 feet and made a drill stem test from 8445 to 8474 feet. The test was made through a quarter-inch choke in one hour and a half. The well showed 30 percent oil, 30 percent mud and 40 percent salt water. The flowing pressure was 645 pounds. At the end of the week the operator perforated casing with 19 holes from 8445 to 8464 feet and was preparing to make a drill stem test. This well has also had the casing perforated a number of times.

Angleton Prospect Interesting

On the Angleton prospect in Brazoria County, Texas Gulf Producing Company has made location for a wildcat to be drilled on the Sparks fee land. The well is located north of Angleton in the William Roberts Survey. It is 804 feet east along the north line of tract in southwest corner of J. R. Shannon 100-acre tract and 3100 feet from the north line of the survey.

This geophysical prospect was discovered with reflection seismograph by Humble Oil & Refining Company and several other major oil companies in 1934 and 1935. After an exciting lease play around Anchor, Chenango and Angleton, several large blocks of land were taken. The principal lease holders in the area are Texas Gulf Producing Company, H. G. Frost, Humble Oil & Refining Company, Gulf Oil Corporation, Atlatl Oil Company, Stanolind Oil & Gas Company, and others. This test will be one of the most interesting wildcats in the Texas Gulf Coast, as it has taken in a trend of leasing which has brought as much as $75 per acre from Angleton to Bonney. There has been one other test drilled south of the new location, which was C. E. Holt's Griffin 1, Bradley Survey, a dry hole at 6010 feet and which was re- well had showings of oil, but this ported to have carried a good sand section.

Refinery Completed at Bay City

Phoenix Refinery is reported to have completed its project in the Bay City field, Matagorda County, and received its first run of crude oil last week. The refinery has a capacity of 1000 barrels and will be furnished with crude oil from the Van Vleck field, where Skelly Oil Company has several producers and just recently discovered two or three deep sands.

On the east flank of the Hawkinsville dome, T. Williams Survey, Sun Oil Company is running five-inch casing to 5234 feet to protect the hole. There has been some rumor that the could not be confirmed. An electrical logging device failed to show any oil sands and the protection string of casing is being run for a production test.

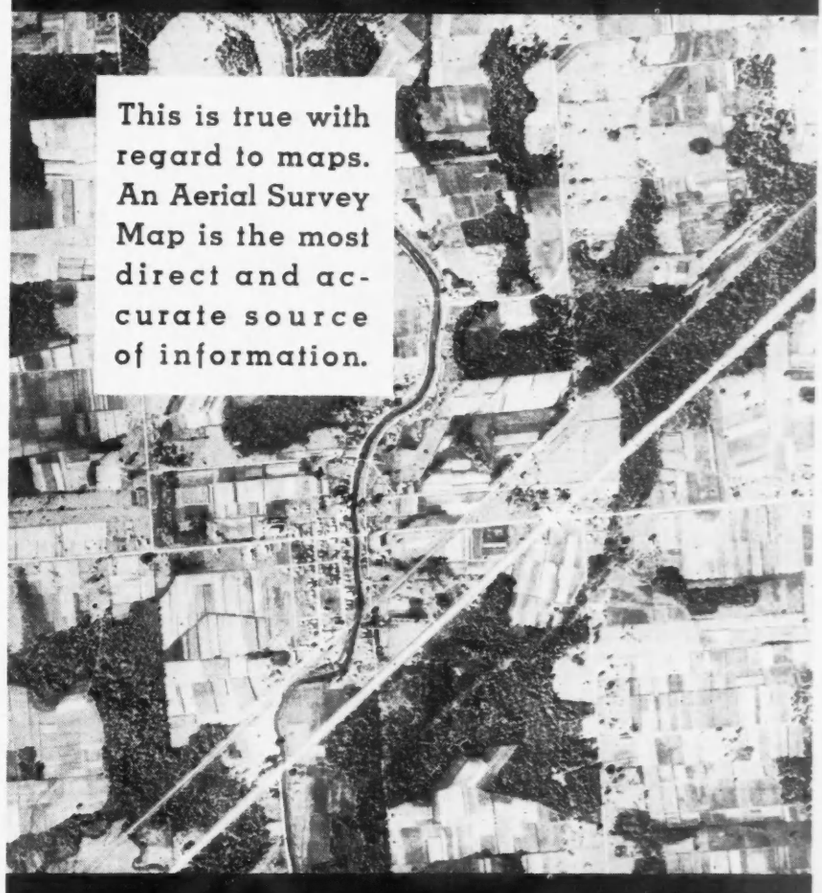
Hamman Exploration Company's M. Cleveland 1, southeast of Bay City, Matagorda County, was running casing to 9442 feet after an electrical logging device was run which is supposed to have showed oil sands. The casing will be set and after hardening for 72 hours it will be perforated at the different sand levels where the reported shows were found.

Helmerick & Payne's Hawkins 1, approximately two miles east of the discovery well at Sheppards Mott, D. A. McCarthy Survey, Matagorda County, was cutting and pulling casing at the end of the week, after swabbing salt water at 7816 feet.

Withers Field Extended South

The Texas Company completed its Pierce Estate C-2 in the Withers field, Wharton County, to extend the field 1000 feet south and established the second producer for the new field. The well was drilled to 5563 feet in oil sand with the top of the sand found

A STRAIGHT LINE IS THE SHORTEST DISTANCE BETWEEN TWO POINTS



EDGAR TOBIN AERIAL SURVEYS

SAN ANTONIO, TEXAS
Fannin 1381

HOUSTON, TEXAS
Lehigh 4358

"There can be no finer map than a reproduction of the land itself"

at 5470 feet. Seven-inch casing was set at 5555 feet. The well was kicked off with gas from the discovery well and it came in making 15 barrels per hour through a quarter-inch choke. The test is located in the Caldwell Survey.

The Texas Company has made location for two additional wells in the field. Pierce Estate C-3 is 933 feet north, 62 degrees east from the discovery well in the J. Caldwell Survey. Pierce Estate C-4 is 933 feet north, 28 degrees west of the discovery well in the J. Caldwell Survey.

In the Pickett Ridge field, Wharton County, the Texas Company has made location for Pierce Estate A-12 and A-13. Pierce Estate A-12 is south 75 degrees seven minutes east 2800 feet from Pierce Estate A-11 and south 29 degrees nine minutes west from A-6, 933 feet in the I. & G. N. Survey, Section 38. Pierce Estate C-13 is north 77 degrees west 933 feet from Pierce Estate A-8 and north 17 degrees, 35 minutes east, 1018 feet from Pierce Estate A-9, in the I. & G. N. Survey, Section 39.

The Texas Company purchased the 320 acres on which the Trinity Drillers, Inc., is now drilling Marek 1, which is approximately 1½ miles northwest of the field.

In Colorado County and in the Garwood area, Coyle Concord's Powell 2-B, I. & G. N. Survey, Section 45, showed salt water again after making a drill stem test at 6114 feet. The well had previously shown salt water at this depth and was drilled on to 6755 feet, was plugged back to 6058 feet. The cement was drilled to 6114 feet and the drill stem test made from 6110 to 6114 feet. The test was made through quarter-inch chokes and showed no pressures. The operators received 11 stands of mud and 44 stands of salt water. The hole has been plugged back to 5800 feet.

BEE COUNTY

Beeville.—Three producers were completed last week in the Dirks-West Tuleta district of Bee County. Sun Oil Company cored the sand to 3825 feet, set casing at 3766 feet and was waiting on cement in C. S. Page 5. Illinois Petroleum Company's Hall 10-B had sand at 3888-95 feet and set casing. Both are in the Dirks area. Herbert Aid's W. A. Booth 1, southwest outpost well to the Ray area of the West Tuleta field, cored sand at 3922-28 feet and is drilling plugs.

Several interesting wildcats are being drilled through the Pettus trend, but none has reached levels where production is expected.

CONROE

Austin, Texas.—The Texas Railroad Commission last week issued an order eliminating water exemptions granted in the Conroe field.

In the past an allowance has been made which permitted wells producing water to be pumped at a rate that produced more oil than the schedules allowed. This will be eliminated under the new program.

The commission pointed out in its order that:

"From evidence submitted at various hearings it is evident that the Conroe field has a considerable water drive, and that a normal water encroachment under hydrostatic pressure is to be expected, and that it is only a matter of time until all wells in the Conroe field will make water in varying amounts as the oil is withdrawn from the reservoir, and that water will encroach to the bore of each individual well in said field."

Lake Charles.—Only eight completions were reported in the Louisiana Gulf Coast during the past week, and of that number six resulted in oil wells with a daily yield of 3228 barrels. Two of the completions were failures.

TEXAS GULF COAST
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
ANAHUAC—		
Humble, Clark 8	720	7083
Tyrell 3	672	7094
Zappe 3	648	7083
BARBERS HILL—		
Mrs Bennett, Gulf Fisher 3 (wo)	327	5636
DAMON MOUND—		
H & N. Oil Co., Wisdon Fee 14	*	855
DICKINSON—		
Humble, Maco Stewart A-6	*	9142
ESPERSON—		
General Crude, Davis 13	*	4210
ANNETT—		
Gulf, Lupfer 6	130	5532
HANKAMER—		
Gulf, Weiser A-1	350	4100
HIGH ISLAND—		
Stanolind, Smith A-13 (wo)	144	5190
LIVINGSTON—		
Aber Oil Co., West Lbr. Co. 1 (wo)	*	4357
Owenly Drilling Co., Pratt 8	349	4211
MARKHAM—		
Hamil & Hamil, Poorboy Myers 1	*	3579
RACCOON BEND—		
Humble, Bellville School Land 10	720	4152
Bracey 2-B	5	3385
Granau 3	378	3220
SPINDLE TOP—		
Stan-Ind, McFaddin 25 (wo)	135	2726
TOMBALL—		
Humble, G. A. Hillegeist B-2	528	5603
J. Holderrieth 2	676	5554
WITHERS—		
Texas Co., Pierce C-2	360	5563
HARRIS COUNTY—		
Texas Gulf Producing Co., Westmoreland 1, Bellaire prospect, J. B. Peir sur	*	9111

*Failures; †Junked; ¶Million cu. ft. gas.

New Deep Formation

DEEPER HORIZON AT LEESVILLE OPENED BY GOOD COMPLETION

Lake Charles.—A deeper producing horizon was developed in the Leesville field, La Fourche Parish, during the past week when The Texas Company completed L. L. E. Leesville 25 with an initial production of 1029 barrels per day from sands found at 4862 to 4961 feet.

The well was drilled to 5058 feet in salt, with the top of the formation having been found at 5054 feet. Casing was run to the bottom and perforated at three different levels. It was perforated with 50 holes from 4862 to 4873 feet; 140 holes, 4873 to 4929 feet and 60 holes from 4937 to 4961 feet. The well came in for 1029 barrels daily through a half-inch choke with a tubing pressure of 590 pounds. The well is flowing 35.3 gravity of 41 degrees pipe line oil.

The Leesville field has been producing from sands in the Miocene at 3040 to 3046 feet and 3388 to 3868 feet. Several wells have been completed from 4300 to 4600 feet but The Texas Company's L. L. E. Leesville 25 is the deepest producer ever completed in the field.

The test is located 2534 feet south and 455 feet west of the NWc of SW¼ of Section 26, in Section 27-21s-22e. It is 600 feet south of L. L. E. Leesville 4, which was completed at 3747 feet for 860 barrels per day showing 40 percent basic sediment and water through a half-inch choke. The gravity of the oil was 24.4 corrected at 71 degrees temperature. The well was later drilled to 4461 feet and completed

for 1728 barrels daily through a half-inch choke with pressure of 535 pounds.

Bayou St. Dennis Extended

The Texas Company completed its Rigolette 2, in the Bayou St. Dennis field, Jefferson Parish during the past week to extend the field 933 feet west and record the fourth producer in the field.

The bottom of the hole at 9606 feet is in sand showing oil. Seven and five eighths-inch casing was set at 9575 feet. The well came in for 1769 barrels per day through a three eighths-inch choke wtih a tubing pressure of 1565 pounds. This well is one of the best wells completed to date in the Bayou St. Dennis field. The test is located 933 feet west of Rigolette 1 and 933 feet south of Bayou St. Dennis 2 in Section 30-19s-24e.

The Texas Company also brought in its Hanzen 1-B in the New Iberia field for a producer during the past week from the new deep sand which was discovered by the same well some time ago. The well was worked over and completed at 5361 to 5367 feet after showing oil on a drill stem test. The well came in for 180 barrels per day through a quarter-inch choke with a tubing pressure of 250 pounds. At the end of the week the well was making 139 barrels daily by heads. The oil tested 27 degrees, showing no salt water.

First Bayou Mallet Failure

The first failure for the new Bayou Mallet field, Acadia Parish, was recorded during the past week when Superior Oil Producing Company and Woodley Petroleum Company abandoned its M. Savoi 1 at 8027 feet in shale after failing to show anything of commercial value. The well is located 1663 feet north and 2508 feet west of the southeast corner of Section 47-7s-1e. This operator has made location for George Bradley 1, in the same section in which M. Savoi was located. The test is located 2582 feet south and 1785 feet west of the northeast corner of Section 47-7s-1e.

Another producer was added to the Tepetate field, Acadia Parish during the past week when Continental Oil Company finaled its C. Miller for 165 barrels. The hole was carried down to 8312 feet, and five-inch casing set on the bottom. The casing was perforated from 8303 to 8312 feet and came in flowing at the rate of 165 barrels per day through a quarter-inch choke. Tubing pressure was 1400 pounds and casing pressure 1300 pounds. The well is a south offset to Kern 1 and is located in Section 29-7s-2w.

The same operator has made location for C. Miller 2, in the center of the N½ of S½ of SE¼ of Section 29-7s-2w. The first independent operators to enter the Tepetate field are Loffland Brothers et al. They have made location for Mrs. L. C. Bowles 1 and A-1. No. 1 is 660 feet west and 330 feet north of the southeast corner of Section 23-7s-2w. No. A-1 is located 2310 feet south and 660 feet west of the northeast corner of Section 28-7s-2w.

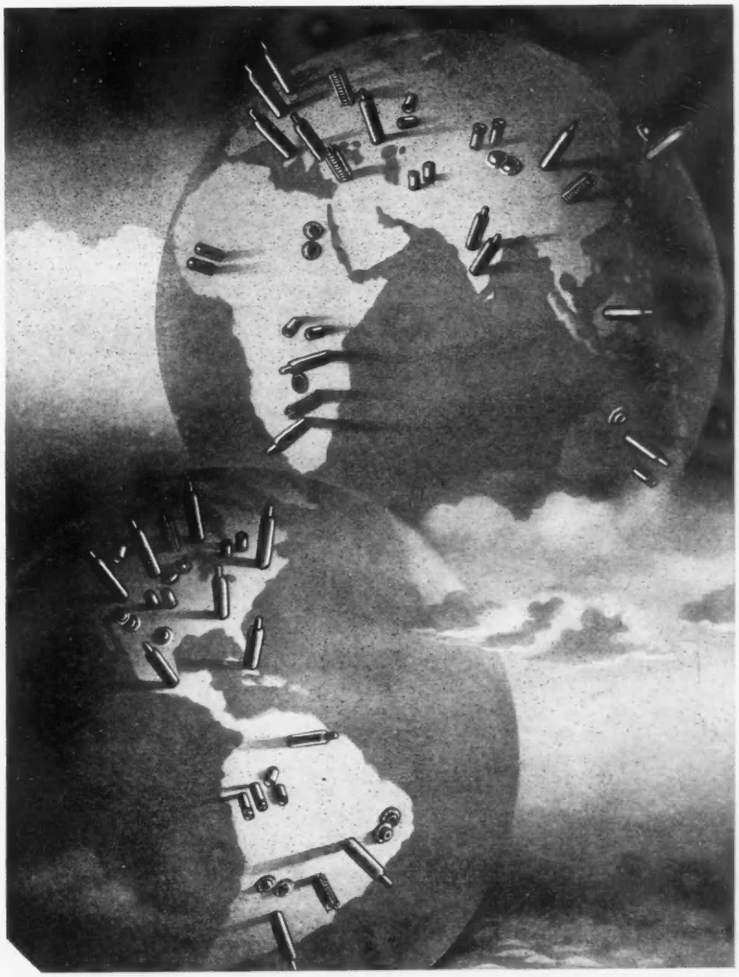
Wildcats Core Oil Sands

The Texas Company's St. Martin Land 8, on the Henderson Prospect, Section 9-8s-7e, St. Martin Parish, was drilling ahead in shale at the end of the week at 5404 feet after coring oil sand from 4900 to 4904 feet in the Miocene formation. Shale was cored from 4753 to 4760 feet. This test is the eighth well drilled on the prospect by the company.

In Iberia Parish and at Jefferson Island, Jefferson Lake Oil Company's Lake Pigneur 274, Township 12s, Range 5e, was drilling in oil sand at 8475 feet after topping the sand at 8457 feet, at the end of the past week. The well has had sands showing oil at about 8464 feet, and seven-inch casing was set at 8397 feet. On a production test the well swabbed salt water. It was decided to carry the well deeper and it is believed that the operators will drill on down until salt is reached and will set another string of casing before making a production test. If the well proves as a commercial producer it will open a new oil field for the Louisiana Gulf Coast.

Union Sulphur Company's Castle 6, drilling test between the Gillis and English Bayou field, Calcasieu Parish, was drilling in sand showing oil at the end of the week making the third or fourth oil sand that the company has encountered since spudding in on the test. At the close of the week the well was down to 5899 feet in sand with the top of the sand showing oil at 5889 feet. It is not known at this time if the operators will make a production test.

It has been predicted that an oil field lies between the Gillis field and the English Bayou area. If this is true, there will be three oil fields with-



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in a few thousand feet of each other. The English Bayou field is only one mile south of the Gillis field and it was thought for a while that the two fields were the same, but by drilling several wells in the area it has been found that the two fields are entirely separate. It has also been proved that the two fields are separated by large faults and that if Castle 6 is a producer, it will be in the faulted area.

A new wildcat location has been made in West Feliciana Parish. Robert L. Morris et al have made location for Percy 1. It is 5280 feet south and 2900 feet west of the most northerly corner of Section 89-1s-4w.

Outside Tests

THREE POSSIBLE EXTENSIONS AT RODESSA HOLD INTEREST

NORTH LOUISIANA

WEEKLY STAFF REPORT

LINCOLN PARISH

Shreveport. — Another wildcat test for possible Glen Rose oolitic lime production in the North Louisiana Basin was started last week when Arkansas-Louisiana Gas Company erected derrick for Causey 1, NE NW NE 32-19n-2w, Lincoln Parish, on a large wildcat block east of Ruston. Seismograph work was recently done in this area.

Monroe, Louisiana.—For a reported consideration of $50,000, Texas-Louisiana Producing and Carbon Company has sold to United Carbon Company 2 carbon black plants, 3 producing gas wells and 80 acres of leases in the Monroe field, the seller reserving mineral rights on the land below 3000 feet.

Shreveport.—Lion Oil Refining Company's John M. Wynn 1, NE SW 9-23n-15w, Caddo Parish, 1½ miles east of nearest production in the Rodessa field, showed salt water when swabbed Thursday, February 20, at 6157 feet. Elevation is 341 feet. Arrangements were made immediately to plug back to the Gloyd sand the base of which was logged at 6092 feet and seven-inch casing cemented at 6145 feet will be perforated in that horizon where there was an oil showing but the porosity was not so good.

Washing of the well was begun, Wednesday, February 19, and continued until late in the night. The well had apparently cleaned itself but refused to flow and swabbing was resorted to. After the swab had been run five times the flow of salt water with a very slight trace of oil resulted. Bottom of the hole was in five feet of lime that had shown oil saturation below several feet of black shale, leaving doubt as to whether it was the "Young sand", the regular oil producing horizon in the Coquina lime or a new horizon as the Young is found above the shale in the regular part of the field.

Bottom of the hole was 31 feet below the recognized water level at Rodessa but as some had held the theory it was east of a cross fault extending from the northeast-southwest Rodessa fault, it had been questioned if the recognized water level at Rodessa was obtained in this test. Furthermore, as the hole was off one degree at 4000 feet some allowance for

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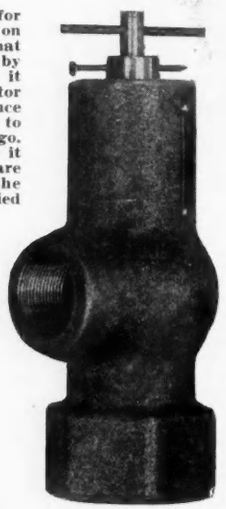

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NORTH LOUISIANA

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
CADDO PARISH (Rodessa)—		
Danciger O&R Co., Willis 1, 23-23n-16w	20,000	6008
Haynes Prod. Co., Jno. Tyson 1, 14-23n-16w	20,000	6042
Lawton 8, 14-23n-16w	20,000	6015
Marr & Perkins, Hunter 2, 13-23n-16w	22,500	6075
Pelican O&G Co., Sexton 9, 14-23n-16w	20,000	6022
Sexton 12, 14-23n-16w	20,000	6015
United Gas Co., Ardis 3, 14-23n-16w	20,000	6015
Ardis 4, 14-23n-16w	20,000	6005
MOREHOUSE PARISH (Monroe)—		
J. E. Farrell & Co., State of La. 10	¶2½	2143
SABINE PARISH (Converse)—		
W. E. Hall et al, Edwards 1, 29-9n-13w	5	2090
UNION PARISH (Monroe)—		
Interstate Nat. Gas Co., Fee 43, 9-20n-4e	¶3¼	2154
Completions last week in Arkansas follow:		
POINSETT COUNTY—		
Rockwell Dev. Co., Fee 2, 13-11n-3e	*	1922
UNION COUNTY—		
J. C. Buckbee, Tr., Sloan 2 14-17-15	*	2149

SOUTH LOUISIANA

BAYOU MALLET—		
Superior Oil Producing Co., M. Savoi 1	*	8027
BAYOU ST. DENNIS—		
Texas Co., Rigolette 2	1769	9606
JENNINGS—		
Ratcliff Oil Co., Martin 7 (wo)	25	1753
LEESVILLE—		
Lincoln Oil Co., Constantine 1	60	4370
Texas Co., L. L. E. Leesville 25	1029	5054
NEW IBERIA—		
Texas Co., Hanzen 1-B (wo)	180	5405
ST. MARTINSVILLE—		
Coastal Plains Oil Co., Ledeux 1	*	5693
TEPETATE—		
Continental, C. Miller 1	165	8312

*Failures; †Junked; ¶Million cu. ft. gas.

further possible deviation was taken into consideration.

Meanwhile, Haynes Production Company's Zylks 1, SE SE 9-23n-16w, one mile west of the most northwestern producer at Rodessa, was to be opened for a test late last week after showing an estimated 15 million cubic feet of gas and considerable distillate and a spray of oil when tested at total depth of 5994 feet; elevation is 215 feet. The showing of oil and gas is believed to be coming from the Gloyd horizon, the second of the three gas producing horizons at Rodessa. This test, which had been condisered off structure and was drilled because of a drilling obligation, surprised operators by checking high on the anhydrite, logging the massive part of this formation from 5363 to 5600 feet and topping Hill sand at 5747 feet.

Another outside test holding interest at Rodessa last week was R. W. Norton's Mary Rives 1, John Collum Survey, Cass County, Texas, which is waiting for cement to set after setting seven-inch casing. This test topped the Dees sand saturation at 6002 feet and topped the Young saturated lime at 6045 feet. Total depth is 6057 feet. Casing was cemented after an electrical tester was run.

The productive limits of the oil field at Rodessa were extended approximately one fourth-mile south by completion of Danciger Oil & Refining Company's Willis 1, Lot 5, Block 7, Rodessa townsite, Section 23-23n-16w, on which has been considered the top of the Rodessa structure and devoid of oil production. Total depth of this well is 6008 feet and seven-inch casing was set on bottom and perforated with a perforating gun five feet off bottom, a practice becoming rather common at Rodessa. The well gauged 33 barrels of oil per hour through 3/16-inch tubing choke with 700 pounds tubing pressure, no pressure of the casing at the time of the initial test being taken.

Six producers were completed last week at Rodessa, including the Danciger well. The others are: Marr and Perkins' Hunter 2, Section 13-23n-16w, completed at total depth of 6075 feet, which made 425 barrels of oil in the first seven hours through ½-inch tubing choke with tubing pressure 1650 pounds and casing pressure 1700 pounds; Pelican Oil & Gasoline Company's Sexton 12, Section 14-23n-16w, completed at 6022 feet, after casing was perforated at 6005-10 feet, making 52 barrels of 47 gravity oil per hour and 20 million cubic feet of gas with tubing and casing pressure of 2000 pounds; Haynes Production Company's Lawton 8, Section 14-23n-16w, completed at 6015 feet flowing 42 barrels per hour through ½-inch tubing choke with 550 pounds casing pressure; United Gas Company's Ardis 3, Section 14-23n-16w, completed at 6015 feet, flowing 50 barrels of oil per hour through ½-inch tubing choke, with 1200 pounds tubing pressure and 2000 pounds casing pressure; Ardis 4 in the same section, both being in southeast quarter, completed at 6005 feet, flowing 53 barrels per hour through ½-inch tubing choke with casing pressure of 1000 pounds and tubing pressure 1200 pounds.

Fifty-seven rigs were running on the Louisiana side of Rodessa last week and three on the Cass County, Texas, side.

More Geophysics

More geophysical crews are being moved into North Louisiana with indications pointing to the largest year in this type of exploration that this area has ever seen.

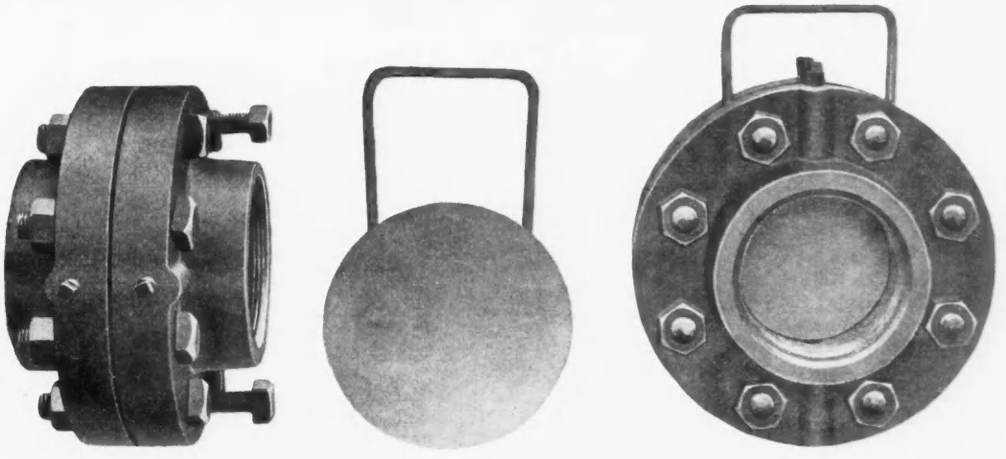
Gulf Oil Corporation is moving in two new crews, Magnolia Petroleum Company is moving in one and Lide & Greer, two. Stanolind Oil & Gas Company is taking all of the Western Geophysical parties off contract work and is moving them into this area. Two seismograph shooting crews of Geophysical Service, Incorporated, are working in Winn Parish between Sikes and Dodson.

The East Texas border counties west of Rodessa continue to be a magnet for geophysical exploration. In Marion County, Sinclair Prairie Oil Company has a unit doing detailed work in the Heirs of John Hanks Survey. Shell Petroleum Corporation's seismograph crew is working in the A. Douthit Survey, and west of Jefferson, United Production Corporation's shooting crew is at work around the Miles Reed Survey. Arkansas-Louisiana Gas Company has sent six surveying crews of 40 men to map every lease it owns in Marion County.

Amerada Petroleum Corporation has completed running a profile from Arkansas-Louisiana Gas Company's Williams 1, a test that is south of the Rodessa fault in Caddo Parish, and was a dry hole below 6500 feet, to R. W. Norton's Haywood 1, Priscilla Evans Survey, Cass County, Texas, an oil producer.

Atlantic Oil Producing Company has moved a torsion balance unit into East Texas and it is working along the Rodessa fault.

Marathon Oil Company's seismo-



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graph party is working around Karnack in eastern Harrison County.

Phillips Petroleum Company's shooting crew which worked for several months in South Arkansas in Union and adjoining counties has been moved to South Texas.

The Griswold Refining Company of Shreveport, which is completing a 5000-barrel refinery two miles north of the town of Rodessa, is reported to have contracted with Vaughn Production Company, headed by Grady Vaughn, for the full allowable of the latter's three producers at Rodessa.

McAlester Fuel Company (J. G. Puterbaugh) has leased storage from Atlas Pipe Line Company at Shreveport. The latter company operates a large refinery here through its subsidiary, Spartan Refining Company.

Pelican Oil & Gasoline Company, R. W. Norton, United Gas Public Service Company and O'Brien Brothers are sending back allowables granted them by the Louisiana Conservation Commission in the Rodessa field to storage they have leased north of Baton Rouge. The oil is to be sold in cargo lots for export. Standard Pipe Line Company's eight-inch Rodessa line is being used as a common carrier for transportation of this crude, the full capacity of the line above the 15,000 barrels the pipe line company buys daily, being used to transport this crude. The line is eight-inch size.

V. A. Sorrell has been given a tender to move 2000 barrels of Rodessa crude by truck to Swastika Refining Company's refinery at Kilgore, Texas. He is reported in his affidavit to have stated he had purchased 20,000 barrels of Rodessa crude for 37½ cents per barrel from T. E. Boyd. The latter is not listed as a producer at Rodessa so is probably handling it as a broker. The Texas Railroad Commission, it is reported here, is requiring the Swastika company to store the Rodessa crude in separate tanks from East Texas oil.

COTTON VALLEY

Shreveport.—Ohio Oil Company's R. L. Holloway 6, NE SW 23-21n-10w, a proposed 10,000-foot test in the Cotton Valley field, Webster Parish, had a strong showing of gas last week at 5540 feet, necessitating the pumping in of weight material while 10-inch casing was cemented at 5380 feet. The test is coring ahead at 5566 feet.

This test has been drilled "tight" and no contacts are available. However, a similar showing at practically the same level was obtained in Magnolia Petroleum Company's McCook & Hibbler 1, Section 22-23n-10w, drilled to 7002 feet several years ago. Cotton Valley produces a heavily saturated gas at 4400-4500 feet in oolitic lime and practically all the acreage in Cotton Valley is held by major companies. The field also has about 350 barrels daily of "stripper" oil production from the shallow level. There has been some trading in royalties around the flanks of the Cotton Valley structure since the gas blowout in the 5540-foot level, which is below the anhydrite.

Plan Deep Drilling

LOUISIANA-ARKANSAS-TEXAS AREAS LEASING IS ACTIVE

Shreveport.—Plans for deep tests in South Arkansas, North Louisiana and a border county of East Texas were revealed last week with the assembling of acreage for such an objective.

Around the John W. Craft Survey, in the eastern part of Harrison County, Texas, W. F. Bridwell of Tyler, Texas, and C. M. Beckett of Marshall, have assembled a 6000-acre block for a proposed 5000-foot test.

In Union County, Arkansas, centering around Sections 14, 15, 22, 23, 26 and 27-18-12, three miles northeast of Strong, C. F. Addy is taking a block calling for a 6000-foot test. He is believed to be working for Phillips Petroleum Company which is drilling a deep test in Section 27-15-15, and has done extensive geophysical work in this county recently.

In Webster Parish, Louisiana, T. W. Stennett and associates are assembling a block around Section 10-19n-9w, for a proposed 5500-foot test. Gulf Oil Corporation is taking scattered leases in Winn Parish.

Lincoln Parish Deal

In Lincoln Parish, Sections 16- and 17-17n-4w, J. S. Rushing of El Dorado, Arkansas, paid $67 per acre base of minerals to Davis Lumber Company. In the same parish, Arkansas-Louisiana Gas Company, which is making location for an immediate test on its block northeast of Ruston, paid $800 for 158 acres in Sections 5-18n-2w, and 32-19n-2w, in this block. In DeSoto Parish, Standard Oil Company of Louisiana, which recently uncovered a geophysical high in this area, has leased 3200 acres at an average of $12 per acre in township 11 north, range 14 west. Other companies having acreage in this vicinity are Ohio Oil Company, Shell Petroleum Corporation, Magnolia Petroleum Company, The Texas Company, Arkansas-Louisiana Gas Company, and Hunter Company.

Start by March 1

In the Lake Bisteneau district, Bienville Parish, W. W. McDowell has a 3500-acre block on which he has a drilling obligation to start a test to the oolitic lime of the Glen Rose by March 22. The block centers in townships 15 and 16 north, range 10 west.

In Jackson Parish, Gulf Oil Corporation, Arkansas-Louisiana Gas Company, The Texas Company, and Lion Oil Refining Company are taking leases in township 17 north, range 3 west. Lion Oil Refining Company is still taking some leases in Bienville Parish, township 16 north, range 9, which has been fairly well leased up where there is evidence of structure.

The block, of 5000 acres, in Bienville Parish, centering in Section 25-14n-6w, blocked by Leon Russ and associates, is for American-Maracaibo Oil Company, it is reported. The block is said to cover a geophysical structure. Arkansas-Louisiana Gas Company has taken 500 acres in the vicinity of this block, which is near the town of Saline.

Two other definitely determined geophysical "highs" in Bienville Parish are now being drilled upon. These center in Section 12-16n-5w, on which Lide and Greer are drilling a test, and in Section 3-16-16, on which Texas-Seaboard Oil Company is drilling.

In Bossier Parish, Producers Oil & Gas Company which recently completed a wet gasser at 5199 feet in Section 17-17n-11w, Sligo gas field, is adding to its holdings. In eastern part of township 17 north, range 11 west, and the west part of 17n-10w, this company has taken 1320 acres from the J. D. Bryan estate. Previously it had taken 1100 acres from the Skannal estate in township 17 north, range 12 west. Ohio Oil Company paid $100 per acre for 500 royalty acres in Sections 13, 14, 15, 23, 25 and 26-17n-12w.

Arkansas-Louisiana Gas Company has assigned several hundred acres of leases in Sections 23, 26, 34 and 36-18n-8w, in Bienville Parish, and lands in Webster Parish, to J. P. Evans.

TESTING AT STAMPS

Cores show evidences of oil possibilities

ARKANSAS

WEEKLY STAFF REPORT

El Dorado, Ark.—Erwin & Leach are preparing to make a drill stem test in Bodcaw Lumber Company 3, NW NW 20-16-23, LaFayette County, Arkansas, which had an oil showing in oolitic lime from 3460 to 3492 feet, immediately under the anhydrite which was logged from 3297 to 3450 feet; elevation is 250 feet. Operators have been doing title work since the showing of oil the preceding week. The test is on a 4000-acre block in which Ohio Oil Company has a half interest, Shell Petroleum Corporation, a quarter, Erwin & Leach, an eighth interest and Housh, Thompson and Hinton, an eighth interest.

Considerable leasing and royalty trading has followed the showing of oil. The test is located south of a fault graben, which, as mapped, extends from the vicinity of Fouke, Miller County, Arkansas, to the Irma field in Nevada County. The fault is said to have a 45 degree angle to the north with varying amounts of displacement, which is said to approxi-

mate 600 feet in the upper Cretaceous in Bodcaw 3. The fault was discovered several years ago by Humble Oil & Refining Company, which drilled a series of core holes in the area.

A total of 27.5 feet of formation was recovered in the cores from 3460 to 4392 feet. The cores showed the following: 18 inches of hard oolitic lime with no saturation; 6 inches of the same kind with an oil stain; 20 inches of oolitic lime with spots of oil; 1 foot of very tight oolitic lime; 6 inches of fairly saturated oolitic lime but with little porosity; 4 feet of hard fossiliferous lime; 6 inches of oolitic lime with dead oil tasting of salt; 4 feet of limey shale; 10 feet of hard oolitic lime with no saturation. The oil stains were very black looking considerably like those in the Rodessa field. This formation corresponds to the Hill sand, the upper of the three gas producing lime horizons in that field.

Phillips Petroleum Company is preparing to make a drill stem test from 3749 to 3782 feet in J. D. Reynolds 1, SE NW 27-15-15, Ouachita County, a deep test in the Smackover field, in what is identified as Tokio formation.

ARKANSAS PERMITS

El Dorado, Ark.—One drilling permit was issued last week by the Arkansas Board of Conservation as follows: Union County (Rainbow City)—G. W. James, M. J. Vessor 2, located 330 feet east and 150 feet south NWc NW SW 12-17-14.

LOUISIANA PERMITS

Shreveport. — Twenty-two drilling permits were issued last week by the minerals division, Louisiana Conservation Commission, of which 11 were for North Louisiana divided among the following parishes: Caddo, 3, including 1 in Rodessa; DeSoto, 2; Morehouse, 1; Ouachita, 2; Sabine, 2, and Union, 1. The 11 in South Louisiana were divided among the following parishes: Acadia, 3; Calcasieu, 2; Iberia, 5; LaFourche, 1.

MISSISSIPPI

Jackson, Miss.—Charles Green, Trustee's Foster Creek Lumber Company 1, C SE 8-3n-1e, Wilkinson County, southwest Mississippi, in which an oil showing was reported 43 feet in the Cockfield recently, last week was shut down at total depth of 5038 feet after an electrical testing device was run in the hole. This test showed a sand at 3904-9 feet with 40 ohms of resistivity and 45 millivolts of porosity.

FLORIDA

Tampa, Fla.—Drilling is scheduled to begin immediately by Gulf States Petroleum Corporation of a test on the Reolds Farms in Hillsborough County. Located 1¼ miles south of a hole drilled in 1921, the present test will seek development in sands reported showing oil and gas pressure above 1300 pounds in the original test.

Start Six Tests

SHORT-TERM LEASES SPURT LEA COUNTY WORK

WEEKLY STAFF REPORT

Hobbs, N. M.—Short term leases situated in the sandy-lime belt in eastern Lea County are responsible for the starting of six tests on wildcat and semi-proved sites, while five additional locations were made the past week in the Eunice, Monument and Cooper areas.

Plains Production Company, Dallas, and Culberson, Irwin and Roy Stovall of Midland, Texas, have started two wildcats each on nearby tracts situated northeast of the Jal townsite and within a three-mile radius to the east and northeast of a 75-barrel producer held by Anderson-Pritchard Production Corporation and R. H. Henderson on the Langlie permit. The latter is producing from sandy-lime at the 3400-foot level. Plains Production Company's George Smith-Humble 1, C SE SE 4-25s-37e, is on acreage farmed out by Humble Oil & Refining Company, and its Risbie L. Mosley-Repollo 1, C NW SE 34-23s-37e, spudded prior to February 15, to comply with lease assignment terms. Culberson-Irwin and Roy Stovall's John R. Stewart-Repollo 1, C SW SE 10-25s-37e, also complied with the spudding date, while the partnership's Jesse B. Humphrey-Humble 1, C SE SW 3-25s-37e, has commenced drilling on acreage assigned by Humble Oil & Refining Company.

Repollo Oil Company's A. L. Christmas 1, NEc NE 28-22s-37e, situated about a half-mile southwest of a recent wildcat completion by N. G. Penrose and Rowan-Nichols Oil Company on the Will Cary permit, is the former's first entry into the sandy-lime belt with a test.

Skelly Oil Company et al's B. F. Harrison 1, C NW SW 5-23s-37e, prospective wildcat producer that has been in process of completion since the fore part of De-

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SHREVEPORT, LOUISIANA

Lake Charles—Houma—Converse
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cember, was restored to production the past week after plugging back from 3796 feet, or 444 feet sub-sea, to 3762 feet to exclude bottom hole water. Difficulty with cavings has been overcome by landing a liner below the 8⅝-inch pipe cemented at 2715 feet. Trouble with cavings was aggravated by 870-quart nitro shot at 3491-3754 feet. The well was swabbing 225 barrels of fluid, including five percent b.s.&w., on 10 hour tests towards the close of the week. This unexpected strike found Skelly Oil Company holding a number of short term leases in the area, and operations were started the past week on Randal B. King 1, C SE NW 4-23s-37e, the seventh fully-owned project launched by the company since last December. The company's Wm. H. King 1, C NE SW 6-23s-37e, missed the oil and gas pay and has been abandoned in sulphur water at 3915-3917 feet, with an elevation of 3382 feet, and Edgar L. Steeler 1, C NW NE 17,23s-37e, appears doubtful for commercial production. It was plugged back from sulphur water in dolomite lime at 3810 feet, or 477 feet sub-sea, to 3783 feet, and swabbed 15 barrels of oil and 60 barrels of water after using 2000 gallons of acid solution. The hole has been plugged back to 3773 feet and again to 3700 feet. The company's Hugh O. Simms 1, C SW NE 4-23s-37e, flowed 168 barrels during first 18 hours and 130 barrels the next 24 hours after 370-quart nitro shot at 3474-3677 feet. It was drilled to 3687 feet, or 364 feet below sea level.

Crafton Oil Company and Amon G. Carter's M. A. Hair-Humble 1, C SW NW 11-24s-37e, semi-wildcat, filled 1200 feet with oil in drilling broken sandy-lime pay at 3630-3760 feet. The oil zone was shot with 100 quarts of nitro February 19, but a bridge formed and the results of the shot will not be ascertained until the obstruction is knocked out with cable tools.

Western Lea County

In western Lea County, W. L. Todd et al's Lemon 1, C NW SW 17-21s-32e, situated on a government permit, was drilling below 2010 feet, according to midweek reports. Sam K. Vierson et al's W. D. Robinson 1, C NW SE 14-11s-32e, only wildcat drilled recently in the northwest portion of Lea County, was abandoned early last week after drilling below 4750 feet. Cores registering oil saturation were pulled at several levels in the upper section of the dolomite lime, and induced the owners to cement seven-inch pipe at 3680 feet, but each production test yielded negative results.

Two ouptpost locations on the northeast flank of the Tobbs structure were in process of completion late last week. Oil Well Drilling Company's J. W. Morris 1, SWc SE 21-18s-38e, was drilled to 4242 feet, or 593 feet sub-sea, while Sun Oil Company's McKinley 1-B, SWc SW NE 9-18s-38e, logged oil pay in lime at 4232-4242 feet, with the hole bottomed at 585 feet below sea level. Both were preparing to swab rotary fluid from the hole to treat the porous lime horizon with acid.

Monument Outposts

Interest in the Mounment area centers upon Repollo Oil Company's J. H. Williams 1, NEc 33-19s-37e, situated several miles east of production, drilling at 4070 feet with 1000 feet of oil and a little water in the hole. First oil was encountered at a sub-sea depth of 271 feet, or at 3858-65 feet, and more saturation at 3913-16 feet, using cable tools. Drilling is now in progress below the water level for the field proper. Oil Well Drilling Company's State 1-A, C S½ W½ NE 29-19s-37e, was the only new location assigned the field last week. It is an east outpost and offsets Amerada Petroleum Corporation's State 1-K, which is drilling below 3640 feet. The new test is on a lease that requires production by April 21.

Eunice Starts

Repollo Oil Company is starting two new tests in the Eunice field, including H. L. Houston 1, NEc E½ NW 7-21s-36e, and State 1, C SW SE 9-22s-36e, situated in the south extension area. The latter is the only recent test authorized by the company with location at center of 40-acre unit, as it has preferred to use 330-foot spacing from property lines. It is an east offset to Texas Pacific Coal & Oil Company's State 1, Lease 2, which produced 620 barrels oil in 3½ hours when deepened from 3835 feet to 3874 feet, or 307 feet sub-sea. It developed from 8 to 12 percent cut oil, and when plugged back one foot shows only 2 percent b.s.&w., flowing through 20/64-inch choke at rate of 17 barrels per hour. General Crude Oil Company and Magnolia Petroleum Company's State 1-E, C NW SW 32-21s-36e, has been completed pumping 57 barrels of oil and 18 barrels of water on initial gauge, with the hole bottomed at 3974 feet, or 351 feet sub-sea. Multiple acid treatments and a nitro shot failed to develop flowing production.

Humble Oil & Refining Company's Adkins 1, C SW SW 10-21s-36e, situated on the east flank of the Eunice structure, succeeded in making a commercial producer after plugging back from 3910 feet, or 319 feet sub-sea, to 3888 feet, with packer set at 3863 feet on tubing. The well responded to treatment with 500 gallons of acid by flowing 71 barrels of fluid per hour, with 14 percent basic sediment, and later made pipe line oil, according to reports.

Proration quota of all fields in Lea County, except for the Maljamar area, was lowered effective with the February 16-29 period by order of the Oil Conservation Committee to compensate for steady gain in new wells. Hobbs field was reduced to 26,184 barrels, or a reduction of 932 barrels, while the other areas, which are prorated on a flat allowable per well, was cut from 114 barrels to 110 barrels daily.

Territory one mile due north of production in the Cooper field has been assigned a location by Republic Production Company, which will drill B. Davis 1, C SW SW 34-23s-36e.

NORTH TEXAS DINNER

Wichita Falls, Texas.—North Texas Oil & Gas Association will hold its sixth annual banquet here on the evening of February 29. New officers elected by the body at a special meeting recently have arranged for several state officials prominent in oil conservation and proration enforcement affairs to make talks. Other guest speakers will be Chas. F. Roeser, president of the Independent Petroleum Association of America, and Jake L. Hamon, president of the Texas division of the Mid-Continental Oil & Gas Association, according to J. Ed. Erwin, secretary-treasurer.

Lance Creek Producer

WYOMING DRILLING ACTIVITY YIELDS TO COLD WEATHER

ROCKY MOUNTAIN FIELDS

WEEKLY STAFF REPORT

Lusk, Wyo.—Despite cold weather which has shut down most of the Rocky Mountain oil operations the Ohio Oil Company completed one well and has two wells near completion in the lower Sundance sand of recently discovered pools in southern Wyoming. In the Lance Creek field Converse Sheep Company's 6, SW SE 32-36n-65w, Niobrara County, gauged 70 barrels per hour through the casing. Production is coming from the third Sundance sand logged at 3707-3742 feet and the fourth Sundance sand logged at 3767-3800 feet with shale break between. The well went out of the lower Sundance at 3800 feet and into the red beds with total depth at 3808 feet. The seven-inch production string is set at 3715 feet.

In the same field the Ohio Oil Company made location for Converse Sheep 5, CSE SW 32-36n-65w. Richards and Comstock 2, NE SW 32-36n-65w, is also a location at Lance Creek.

The Ohio Oil Company and the California Company has one well nearing completion in the Big Medicine Bow Dome, Carbon County. The well, Union Pacific Account 1, NE SW SW 24-21n-79w, is running the seven-inch production casing to 5260 feet. Recovered cores from the first and second Sundance sands showed good saturation with no traces of water. No drill stem tests have been taken. First

Sundance was logged at 5259-5300 feet and the second Sundance at 5381-5470 feet.

Another well nearing completion is the Ohio Oil Company's Harrison Cooper 3, NWc S 35-30n-78w, in the Rock River field, Carbon County. It is rigging up to run liner with hole bottomed at 3228 feet in the lower Sundance. Harrison-Cooper 10, SW SW 35-20n-78w, in the same field, is still tied up with fishing job at 3030 feet.

In the Dutton Creek field, Carbon County, Sidney H. Keoughan joint with the Union Oil Company of California's Union Pacific 20-X, 1800 feet west of the east line and 1320 feet north of the south line 1-18n-78w, is shut down at 4400 feet. This well is deep test to the unexplored Sundance.

The California Company is drilling at 2056 feet in Holst 3, NE SW SE 13-17n-77w, on Quealy Dome, Albany County.

Northern Wyoming

Practically all operations in the northern Wyoming oil fields are still shut down awaiting warmer weather. The Stanolind Oil & Gas Company's State Ridgely 26, SE NE SE 19-46n-98w, is resuming after changing boilers and cementing formation to regain circulation. Hole bottoms at 2492 feet.

The Ohio Oil Company's two wells in the Byron field of Big Horn County, report as follows: Charlotte Lindsay 1, CNW NE 23-56n-97w, is drilling at 4891 feet while Byron-Union 4, CSW NE 22-56n-97w, is drilling red beds at 5423 feet.

MOUNTAIN STATES
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
MONTANA		
HARDIN GAS FIELD: (Big Horn County)—		
Lou Torske 1, ne se 19-1s-33e	¶¼	665
LIBERTY COUNTY: (Whitlash Field)—		
Western Natural Gas Co. Turner 1, cse 15-37n-4e	¶1½	1635
NEW MEXICO		
EDDY COUNTY (Maljamar Field)—		
Emperor Oil Co., Puckett 2, cnw ne 24-17s-31e	50	3862
EDDY COUNTY (Artesia Field)—		
Tignor, Etz & Keyes, Keyes 3-A, ne nw 10-17s-28e	¶12	1400
R. D. Compton, Brainard 7, se se 5-18s-27e	15	1263
SAN JUAN COUNTY: (Rattlesnake Pool)—		
Continental, Tribal 49, sw ne ne 2-29n-19	142	845
LEA COUNTY (Eunice Field)—		
Conoco & California Co., A. M. Lockhart 2-B-28, c sw nw 28-21s-36e	2000	3930
A. E. Myer 3-B-4, c lot 16, 4-21s-36e	960	3870
A. E. Myer 5-B-4, nec ne se 4-21s-36e	750	3880
Gen'l Crude Oil Co.-Magnolia, State 1-E, c nw sw 32-21s-36e	57	3974
Humble, A. J. Adkins 2, c sw sw 10-21s-36e	1420	3910
LEA COUNTY (Monument Field)—		
Conoco, State 1-D-19, c nw sw 19-19s-37e	2500	3977
Republic Prod. Co., Selby-Maveety 2, c ne sw 35-19s-36e	1500	3927
LEA COUNTY (Wildcat)—		
Skelly Oil Co., Wm. H. King 1, c ne sw 6-23s-37e	*	3917

*Failures; †Junked; ¶Million cu. ft. gas.

DRILLING RETARDED
Cut Bank gets first well completion in weeks

Great Falls, Mont.—Sub-zero weather has virtually put a standstill to drilling in two northern Montana oil fields. The Cut Bank field, Glacier County, however, had its first completion in several weeks. This completion was McCabe Jeffries' Rasmusson 1, SW SE 32-33n-5w, flowing 70 barrels in the first hour. Due to lack of storage the well has been shut in. It is estimated at 100 barrels.

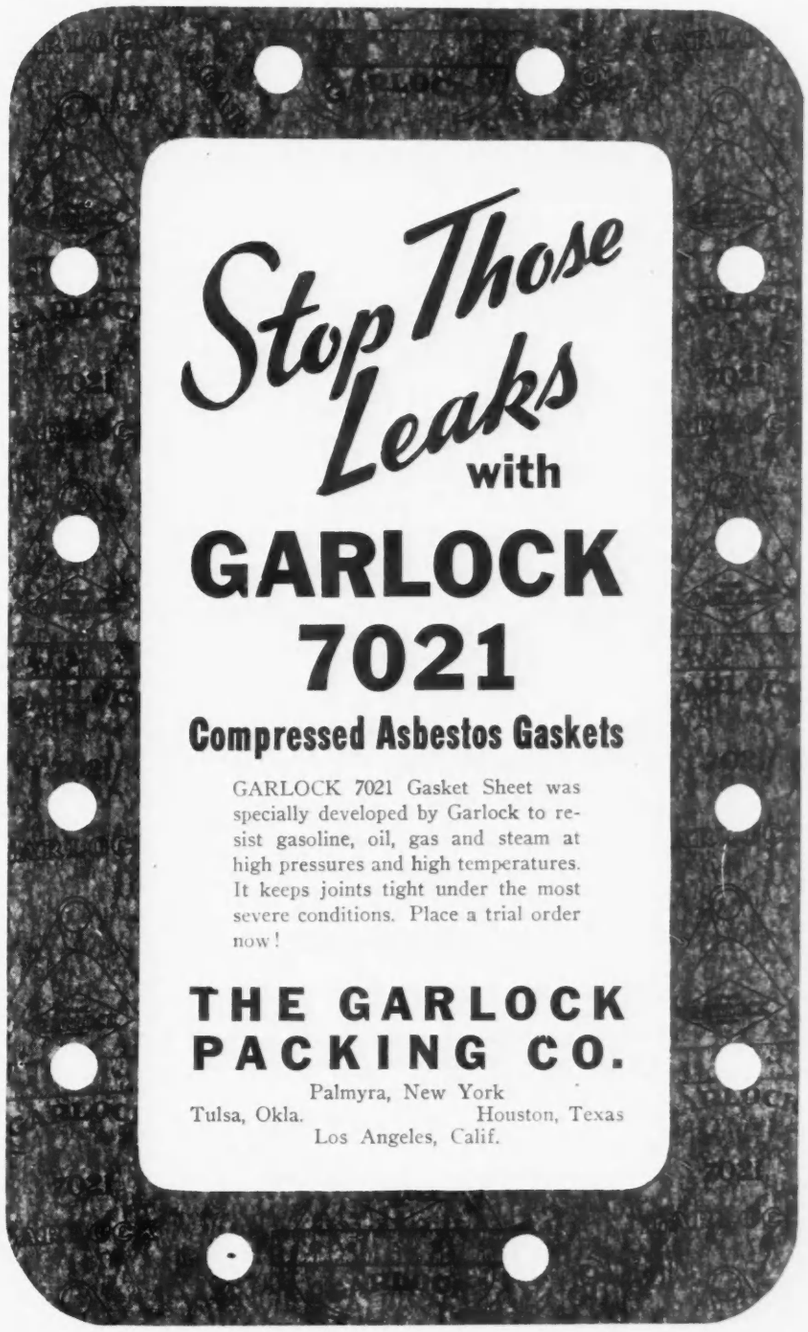
Rasmusson 1 is an offset to McCabe Jeffries Government 1, which is pumping approximately 105 barrels daily. The only other active well in the field is the Montana Power Gas Company's Whetstone 2, SW NE 8-33n-5w, drilling at 2525 feet.

A new test was started this week in an undeveloped part of the Kevin-Sunburst field, Toole County. Tommy Herriman et al's 1, in the southwest corner of 5-35n-2w, on the A. L. Beaupre farm. Cook and Eddy's Kaskin 1, SW SW SW 25-36n-2w, is still waiting for higher temperatures to complete.

The Daniels Petroleum Company's May 1, CSE SE 13-1s-33e, in the Hardin gas field, Big Horn County, southern Montana, is drilling at 3011 feet.

Cat Creek

West Dome Oil Company's 1, SW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SE NE 9-15n-29e, on Cat Creek Dome, in Garfield County, southern Montana, is drilling at 631 feet.

Baker-Glendive

Montana-Dakota Utilities Company's Unit 1, NE NE NE 17-4n-62w, deep test of the Baker-Glendive anticline, Fallon County, eastern Montana, is shut down at 6340 feet.

Stockholders of the Valley Osage Oil Company named as directors during the week S. S. Walkowaik, N. T. Gilbert, C. A. Solt, W. A. Goforth and T. H. Gilbert. Goforth is president; N. T. Gilbert, vice president; T. H. Gilbert, vice president; and Solt, secretary-treasurer. The company has producing properties in Oklahoma and Texas.

LANCE CREEK OUTLET

New line will be 24 miles to Fort Laramie

Casper, Wyo.—The Illinois Pipe Line Company made application to the Wyoming Public Utilities Commission last week for certificate showing convenience and necessity to lay a line from Lusk, Wyoming, to Fort Laramie, Wyoming. Construction will give an outlet for Lance Creek crude. At Fort Laramie the line will tie into the Stanolind Pipe Line Company's line from Teapot, Wyoming, to Freeman, Missouri. The projected pipeline would be joined with the Illinois Pipe Line Company's 24-mile 6-inch line from Lance Creek to Lusk. It is believed that a booster station will be installed south of Lusk to pump oil over a high point about nine miles south of the town.

Stanolind Pipe Line Company is reconditioning its line from Clayton, Wyoming, to Bridgeport, Nebraska, after recalling this section of the line from the North Central Gas Company which has leased it. The company will soon start running crude from its Clayton, Wyoming, tank farm to its middle western refineries at Neodesha, Kansas, Sugar Creek, Montana, and Whiting, Indiana. The company will move around 12,000,000 barrels of Salt Creek crude oil held in storage at the Clayton farm.

Three Deep Tests

WIDELY SCATTERED DRILLING HOLDS WEST COAST INTEREST

WEEKLY STAFF REPORT

Los Angeles.—Midway between the towns of Pismo Beach and San Luis Obispo, south of the small, low gravity Enda field, lies an area which has been quietly exploited during the past seven years. Impeded with cloudy land titles, some of which involve the legality of old Spanish grants, this territory is to arrest state-wide attention during the next few months. The inauguration of a competitive drilling campaign is regarded a certainty.

In Section 5-32-13, two wells have been drilled with cable tools to 3000 feet and are pumping an aggregate of 500 barrels a day of 21 gravity oil. Considerable gas accompanies the production of these two wells. Strength is given the belief that subsequent drilling in more favorable structural locations will be productive of flowing wells. The oil, although free from water, is high in sulphur content. The source of this production is found in the massive porous sand beds of the Miocene formation, which unconformably overlies basic Jurassic rocks in this coastal region.

The development and ultimate producing of the structure offers attractive possibilities to operators interested in this embryo oil field. The drilling will be comparatively shallow and cheap, as the best production will be found between 3000 and 3500 feet. One string of casing will be sufficient. Two or three hundred feet of oil producing formation will be encountered. The transportation of the oil offers no difficulty. The area is adjacent to the main coastal line of the Southern Pacific Railroad and in addition, Union Oil Company's Port San Luis marine line is located a few miles north of the present producing wells.

Drilling obligations demand immediate action on several parcels of land and a brisk program of development will be seen by spring.

Three Important Tests

Three important tests of the deep Eocene sands are being made in California. Each is in the critical stage of development and will soon demonstrate the possibilities of obtaining Eocene production from three widely separated areas.

Barnsdall Oil Company-Rio Grande Oil Company's Bell 12, deep Eocene test of the Elwood field near Santa Barbara, is being cored at 7290 feet in shale and oil sand. Five and three quarter-inch casing is cemented at 6725 feet and last week a production test was conducted with the bottom of the hole at 7157 feet. The recovery proved to be all water and rather than attempt to correct the water problem at this time, operators are deepening for a test of the lower formations. Success in uncovering a productive sand at greater depths may result in casing off the upper showings entirely.

The North Belridge field, in Kern County, will soon know of its deeper Eocene potentialities. Union Oil Company has drilled Gibson 7, in Section 36-27-20, to 9492 feet, plugged back to 9205 feet and 4¾-inch casing has been cemented at 9205 feet. The top of the oil sand was cored at 9224 feet, underlying a hard, black, impervious shale body, top of which was cored at 9175 feet. The extreme hardness of the formation will permit a production test to be made with no perforated liner below the shoe of the cemented casing. After proving itself a commercial producer at this depth, operators will kill the flow, run a perforated

CALIFORNIA

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
LONG BEACH—		
Bay Oil Co., No. 1	200	4120
World Oil Co., No. 2	*	4425
KETTLEMAN HILLS—		
Standard, No. 23-29J	8000	8658
FRUITVALE—		
General, Hensley 2	220	3898
KERN FRONT—		
C C M O, No. 23-55	330	2150
Republic Pet. Co., Strassburger 6	300	2002
Texas Co., Lehman 18	150	2010
MIDWAY-SUNSET—		
General, Moco 61	65	2102
MOUNT POSO—		
Baker-Grover Co., No. 3	385	1678
TRACY—		
Amerada, F.D.L. 4	¶10	4050
SANTA MARIA—		
Union, Newlove 41	*	3242

*Failures; †Junked; ¶Million cu. ft. gas.

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oil string to the bottom of the hole and return the well to production.

Union Oil Company's Lillis-Welch 1, exploratory well in Section 24-21-16, has been drilled to 11,147 feet and plugged back to 10,760 feet. The 6⅝-inch casing is cemented at 10,813 and perforated 10,747-10,737 feet and 10,831-10,698 feet. The well was swabbed through two-inch tubing and very little fluid entered the hole. The perforations have been washed and the operators are preparing to perforate higher in order to test two zones in their next attempt to place the well on production.

Royalty Service Corporation's wildcat project, in Section 16-24-18, is deepening at 2350 feet in sandy shale. A production test, with the bottom of the hole at 1987 feet, demonstrated the presence of oil, but the operators have temporarily given up their plan to place the well on production at this time. The well is being deepened in search of productive sands lower in the Temblor section. It is estimated this section is of 1000 feet in thickness and overlies the Kreyenhagen formation, also considered a potential oil bearing horizon in this region.

Shiells Canyon

Shiells Canyon field, Ventura County, has been given renewed life in the completion of Bankline Oil Company's Calumet 2, an exploratory test of the deeper Sespe sands, Section 3-3-19. The well was drilled to 3674 feet and 10¾-inch casing was cemented at 3638 feet. Initial production was obtained of 650 barrels a day of 38.4 gravity oil, along with 250,000 cubic feet of gas.

Baker Grover Company completed its third well in Section 33-27-28, southern extension area of the Mt. Poso field, for 387 barrels a day of 16 gravity oil. The well is producing from the Vedder sand, lower Miocene, bottomed at 1678 feet, with 8⅝-inch casing cemented at 1604 feet. Section 33, as well as the surrounding acreage, had been condemned by operators who are active in the Mt. Poso field proper. Several previously drilled prospect holes had apparently proven the presence of undesirable subsurface conditions in this area. Baker Grover Company's completion of Well 1 in July, 1935, for 250 barrels a day has again reopened leasing activity in this district.

Los Angeles County

Engler & Long's Millard 1, wildcat test in Section 25-3-12, Los Angeles County, was drilled to 5888 feet, plugged to 5130 feet and 8⅝-inch casing was cemented at 4842 feet. The performance of the well has failed to meet expectations held for it by interested parties. An unsuccessful production test was conducted last week, in which the well demonstrated all water. The operators are attempting to locate the source of the water before making additional tests. Favorable indications were encountered during the drilling of this project, resulting in large blocks of acreage being obtained by major and independent operators.

Los Angeles—The Southern California Meter Association will hold its annual Hi Jinks and banquet the night of February 29, at the Wilshire Lodge Hall, in Los Angeles.

EASTERN STATES

WEEKLY STAFF REPORT

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
OHIO		
NOBLE COUNTY—		
T. & G. Rich, Stranahan 7	2	1373
Geo. Jewell & Co., Beehler 7	*	1300
Wood Realty, Miller 4	*	242
E. C. Merry & Co., Homan 8	*	175
Hall & Co., Blair 1	¶	1480
Metcalf & Co., Masters 9	*	944
MONROE COUNTY—		
John Lumbatis & Co., Robinson 1	2	1263
Hill Oil & Gas Co., Dye 6	¶	1630
MEDINA COUNTY—		
Ohio Fuel Gas Co., Grim 1	¶	....
Edwin Obermiller, Stengass 2	¶	2733
STARK COUNTY—		
East Ohio Gas Co., Holtzbach 1	¶	4342
Obermiller & Co., Rose 1	¶	4516
HOLMES COUNTY—		
Bell Bros., Conrad 1	¶	780
KNOX COUNTY—		
George Lacknett, Riggs 7	*	676
WASHINGTON COUNTY—		
Wickens & Aikens, Wickens 20	5	1022
Otto Heldman, Adams 5	¶	1410
G. A. Pickens, Adkins 20	4	425
King Oil Co., King 3	1	1109
Williams Bros., Carruthers 5	¶	3181
D. T. Orndorf, Stull 4	7	793
MEIGS COUNTY—		
Hall & Co., Circle 1	¶	1957
MEDINA COUNTY—		
E. R. Edson Sons Co., Miller 70	3	....
Wideman 8	5	539
Pittsford & Co., Gillman 21	20	498
MONROE COUNTY—		
Stout & Schafer, Koevert 1	¶	2188
SUMMITT COUNTY—		
East Ohio Gas Co., Bexler 4	¶	4138
ASHLAND COUNTY—		
Moore & Co., Black 9	15	....
TUSCARAWAS COUNTY—		
Frye & Co., Lebold 1	¶	4793
ATHENS COUNTY—		
O. F. Lowther & Co., Cody 1	¶	1720
LORAIN COUNTY—		
Frank Mondeth, Rosencrans 1	¶	949
MEIGS COUNTY—		
Ohio Fuel Gas Co., Hart 1	¶	1073
McDade 1	*	2089
Conant 1	¶	1898
Haley 1	¶	922
J. Fleming, Diem 1	4	818
Meigs Development Co., Starr 4	¶	774
Houston & Co., Powell 1	¶	1990
Jividen 2	¶	2084
Roy Holmes & Co., Wolf 1	*	1899
MEDINA COUNTY—		
Edson & Son Co., Miller 70	3	515
Ohio Fuel Gas Co., Crocker 1	*	....
Miller & Lalshaw, Miller 9	2	....
ATHENS COUNTY—		
Hocking Valley Drlg. Co., New York Coal Co. 1	¶	3833
H. O. Bode, Byeforeman 1	*	1180
MONROE COUNTY—		
J. DeLong & Co., Baker 1	2	1450
PERRY COUNTY—		
Hopewell O&G Co., Emmert 5	¶	3036
Ohio Fuel Gas Co., Wingardner 1	¶	927
FAIRFIELD COUNTY—		
Bishop & Patton, Schaffer 1	2	2055
City Nat. Gas Co., Crile 2	¶	2321
HOCKING COUNTY—		
Preston Oil Co., S. C. C. C. 124	175	3483
MORGAN COUNTY—		
Ohio Fuel Gas Co., Chappelear 1	¶	1590
Kepple & Co., Vanfoson 13	¶	1588
BELMONT COUNTY—		
E. L. Johnston & Co., McMungis 8	2½	90
LORAIN COUNTY—		
W. Dempsey, Fisher 1	¶	2329
Ohio Fuel Gas Co., Smith 1	*	....
STARK COUNTY—		
White & Lyons, Daniels 1	¶	4490
HOLMES COUNTY—		
Bell Bros., Findley 2	¶	776
KNOX COUNTY—		
Milwood Sand Co., Milwood Sand Co. 1	*	760
LICKING COUNTY—		
W. Ehrle Gas Co., Watson 3	*	1442
Settles Oil Co., Smith 8	6	1933
TUSCARAWAS COUNTY—		
Columbia Carbon Co., Schaar 1	¶	5058
VINTON COUNTY—		
Kelch Bros., Peters 1	10	....
COSHOCTON COUNTY—		
Griffin, Harmer & Gustin, Reed 15	¶	2818
McWaltz, Lawrence 10	6	752
Frank Lyons & Co., Fair 1	*	3362
GUERNSEY COUNTY—		
Beaboat & Co., Quillan 6	16	3455
MUSKINGUM COUNTY—		
Mid-East Gas Co., Bowman-Christy 1	¶	4470
CUYAHOGA COUNTY—		
Geo. Lacknutt, Biggs 7	*	676
WEST VIRGINIA		
RITCHIE COUNTY—		
West Turn Oil Co., Glass 4	30	1910
Rowland & Co., Boner 1	2	1840
WETZEL COUNTY—		
C. B. Fleming, Edgell 2	20	2087
BOONE COUNTY—		
Pure Oil Co., Federal Coal Co. 76	¶	3053
UPSHER COUNTY—		
Columbia Carbon Co., Bennett 1	¶	4700
CABELL COUNTY—		
H. H. Baker Gas Co., Beckett 4	¶	1358
Pridemore & Waldon Gas Co., Beckett 1	¶	1315
ROANE COUNTY—		
H. H. Staats, Balte 1	*	1700
United Fuel Gas Co., Looney 4572	¶	2003
CALHOUN COUNTY—		
K. M. Hunt & Co., Brannon 1	¶	2143
GILMER COUNTY—		
Coleman & Hamilton, Gainer 2	¶	1731
KANAWHA COUNTY—		
G. L. Cabot, Inc., A. D. Huntington 49	*	2885
RALEIGH COUNTY—		
G. L. Cabot, Inc., Beaver Coal Co. 9	*	3603
BOONE COUNTY—		
Boon County Coal Co., Boon Coal Co. 1 5	¶	2936
ROANE COUNTY—		
K. M. Hunt & Co., Riddle 1	5	1738
H. Anderson & Co., Roberts 1	*	....
CABELL COUNTY—		
Kanawha-West Va. Gas, Farley 1	¶	1306
Shale Gas Co., Carter 1	¶	3671
RITCHIE COUNTY—		
B. Gilmore & Co., Hayhurst 1	¶	....
Pittsburg O&G., Wince 15	*	1987
E. S. Gilmore & Co., Carpenter 1	*	1835
J. C. Connor & Co., Rogers 1	¶	1853
West Turn Oil Co., Glass 4	65	....
Hope Construction & Refining Co., Putnam 1	10	....
KENTUCKY		
OHIO COUNTY—		
Ekes & Engle, Jones 1	*	....
Snowden-McSweeney, O'Dell 24	25	....
George Engle, Parton 3	*	....
Snowden-McSweeney, Cheek 3	*	....
Kentucky Nat. Gas Corp., Dugan 10	35	....
Irvington Developing Co., Sullivan 1	*	....
Snowden-McSweeney, Cheek 4	12	....
HANCOCK COUNTY—		
F. E. Patton, Navlin Church 1	¶	....
J. B. Mayer, Pool 4	4	....

MICHIGAN

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
MECOSTA COUNTY—		
Wiser Oil Co.'s House 1, 13n7w, c sw sw-30	¶6	1318
Crane 1, 13n-7w, c se ne-33	¶16	1321
Taggart Brothers, McKeough 1, 14n-9w, c sw sw-2	*	4050
MIDLAND COUNTY—		
Pure Oil Co.'s Younglove 8, 13n-1w, sw se sw-17	*	3411
Root C-8, 13n-7w, sw nw nw-20	25	3405
MONTCALM COUNTY—		
Pure Oil Co., Hocket 1, 12n-7w, c ne ne-5	¶7.7	1303
Superior Drill Co., Eckert 2, 12n-7w, c nw ne-10	¶33	1305
Gordon Oil Co., Strait 7, 10n-5w, sw ne sw-3	50	3204
Isabella Oil Co., Conners 2, 11n-5w, ne se ne-27	*	3259
OGEMAW COUNTY—		
R. F. Ide, Wilcox 2, 22n-2e, sw nw nw-28	15	2713
SAGINAW COUNTY—		
Smith Petroleum Co., Bois 3, 10n-6e, sw nw ne-20	15	1545

*Failures; †Junked; ¶Million cu. ft. gas.

THE OIL WEEKLY REPORT ON IMPORTANT *Wildcat Tests*

ALABAMA

FRANKLIN COUNTY — McAlpine et al's Hobson et al 1, 26-8s-14w, co at 2589 ft.

HOUSTON COUNTY — Rice O&G Co.'s Oakley Est. 1, 9-3n-29e, skidding over for new hole after junking at 3438 ft.

LAMAR COUNTY — DeSoto O&G Co.'s Gardner 1, nw nw 22-15s-16w, pb to perf csg at 3118-35 ft old td 4900 ft lime.

ARKANSAS

ASHLEY COUNTY—Seaboard Oil Co.'s Fee 2, nw ne 28-17-4, rur.

CRAWFORD COUNTY — Trumbo et al's Craddock 1, c nw ne 3-11-30, rur.

HEMPSTEAD COUNTY—Dixie Drlg. Co.'s Vada Wheatley 1, nw sw ne 14-11-26, wo on surf csg. Geo. L. Glass' May B. O'Brien 1, ne sw 32-12s-23w, rur. May & Easton's Conway 1, sw nw sw 20-12s-27w, elev 290 ft wocs 12½-in csg 80 ft.

LA FAYETTE COUNTY—Erwin & Leach's Bodcaw Lbr. Co. 3, nw nw 20-16-23, elev 250 ft 13⅜-in csg 330 ft cored oolitic lime & shale below anhydrite with so 3460-92 ft arr make ds test td 3492 ft. Joe Modisett et al's Frost Lbr. Co. 1, (sec hole), sw sw 29-19-24, elev 261 ft 9⅝-in csg 1960 ft arr deepen 2661 ft.

MILLER COUNTY—Odell Hinson's Montana Realty Co. 1, ne nw nw 3-17-28, rur. J. W. Jones et al's J. H. Bush 1, ne ne 2-19-27, mim. King Oil Corp.'s G. W. Crank 1, sw nw 19-16-25, sd cur titles 4000 ft. C. V. Lenz's Dale 6, ne sw 24-15-26, rur.

OUACHITA COUNTY—Griggsby & Aarnes' Burris 1, sw nw ne 19-15-19, elev 244 ft fsg td 3565 ft. Phillips Pet. Co.'s J. D. Reynolds 1, se nw 27-15-15, 13⅜-in csg 619 ft cored sand 3749-82 ft arr make ds test td 3782 ft. W. B. Street, Tr's Rath & Cartier 1, sw sw ne 35-13-18, dr 1730 ft lime.

UNION COUNTY—J. C. Buckbee, Tr's Sloan 2, se nw 8-17-12, elev 151 ft top Nacatosh 2138 ft dry abn td 2149 ft. F. C. Henderson's Sheppard 1, ne nw 35-17-15, elev 195 ft top Nacatosh 2120 ft tested 75 ft fluid & 200,000 cu ft gas sd 2192 ft.

CALIFORNIA

FRESNO COUNTY

MONOCLINE RIDGE—Seaboard Oil Corp.'s Lillis-Welch 1, 30-16-14, td 525 ft wocs 13⅜-in 504 ft.

COALINGA—Jas. M. Conlon Co.'s No. 1, 30-19-15, dr shale 680 ft.

KERN COUNTY

BELRIDGE—Albert Beck's Beck-Bacon 1-35, 35-28-20, dr shale and sand 1651 ft.

BUENA VISTA LAKE—Ohio's K.C.L. A-5, 31-31-26, td 5243 ft, running formation tester.

COMANCHE POINT—Shell's Bank One 1, 15-32-29, sd 5394 ft. Tejon Ridge Oil Co.'s No. 1, 23-32-29, sd 2182 ft, bad roads.

DEVIL'S DEN—Cumberland Oil Co.'s Mabry 2, 17-26-18, dr hard shale, streaks sand 4458 ft.

EDISON—Navy Oil Co.'s Caravel 1, 19-30-30, td 1447 ft, pumping water trace oil.

FRUITVALE—Elliott Core Dr. Co.'s Elliott 1, 14-29-27, td 3900 ft, plug 3412 ft, set liner and perforated, to test Mullane & Hall's Truesdell 1, 14-29-27, td 2804 ft, rur to deepen.

GRAPEVINE—Silver Gate Co.'s Tejon 1, 7-10-19, td 2985 ft, co to set 4-in casing.

LOST HILLS—Standard's United 1, 2-26-20, dr sand and shale 5955 ft.

McFARLAND—Woods & Bailey's No. 1, 16-26-26, dr gray sand and shale 2715 ft.

McKITTRICK—Belmac Dr. Co.'s Douglas 1, 22-29-21, td 4800 ft, fsh

MOUNT POSO—Stabeck & Gardner's Glide 1, 31-27-28, sd 750 ft.

MOUNTAIN VIEW—Standard's Garcia 1, 13-30-28, dr gray sand 4513 ft. Treasure Oil Co.'s No. 1, 12-30-28, rur.

NO. MOUNT POSO—H. Mann's No. 2, 27-26-28, td 1400 ft, r. Top oil sand 1390 ft.

ABBREVIATIONS

The following abbreviations, signs, etc., are used in completions and wildcat reports in THE OIL WEEKLY.

*—*dry hole abandoned well.*	owdd—*old well drilling deeper.*
‡—*salt water (completions).*	owpb—*old well plugging back.*
†—*junked and abandoned.*	pb—*plugged back or plugging back.*
¶—*million feet of gas.*	r—*reaming.*
abd—*abandoned.*	rog—*rig on the ground.*
bbls—*barrels.*	rur—*rigging up rotary tools.*
b.s.—*basic sediment.*	rust—*rigging up standard tools.*
csg—*casing.*	sd—*shut down.*
co—*cleaning out.*	sdtr—*sidetracking.*
dd—*drilling deeper.*	sg—*show gas.*
dk—*derrick.*	si—*shut in.*
dr—*drilling.*	so—*show oil.*
fsg.—*fishing.*	so & g—*show oil and gas.*
ft—*feet.*	spd—*spudding.*
hfw—*hole full of water.*	sr—*straight reaming.*
in—*inches.*	sw—*salt water.*
lcn—*location.*	td—*total depth.*
m—*milling.*	ur—*underreaming.*
mim—*moving in materials.*	wih—*water in the hole.*
mit—*moving in tools.*	wo—*workover.*
mot—*milling on tools.*	wocs—*waiting on cement to set.*
n, s, e, w—*north, south, east, west.*	wosr—*waiting on standard rig.*
oih—*oil in hole.*	

Santa Carla Oil Co.'s Glide 1, 7-26-28, sd 900 ft.

STRAND—Ohio's No. 1, 1-30-25, rur.

SO. BUTTON WILLOW—General's No. 1, 5-30-24, dr sandy shale 5647 ft.

STEVENS—Shell's K.C.L. 1, 29-30-26, dr sand and shale 4237 ft.

WHEELER RIDGE—Reserve O&G Co.'s Tejon 5, 2-10-19, dr hard shale 564 ft.

MISCELLANEOUS

HUMBOLDT COUNTY—Texas Co.'s Eureka 2, 22-3-1, rur.

KINGS COUNTY — Royalty Service Co.'s No. 1, 16-24-18, td 2348 ft, tested oil sand at 1987 ft, to deepen. Standard's Tulare Farms 1, 34-24-23, dr shale 550 ft. Commonwealth Cons. Gas Co.'s No. 2, 21-22-20, sd 2460 ft. Hancock-Union Oil Co.'s Giannini 1, 28-22-20, td 2913 ft, plug 2108 ft, redr to 2615 ft, to test. Kettleman View O&G Corp.'s No. 1, 29-22-19, td 1401 ft, to plug back and test showings at 1385 ft.

MERCED COUNTY—J. R. Murrell's No. 1, 8-10-9, td 1300 ft co.

SAN JOAQUIN COUNTY—Amerada's F. D. L. 5, lcn.

SAN LUIS OBISPO COUNTY—Pismo Pet Co.'s Scott 1, 5-32-13, lcn. Emerich Oil Co.'s Holland 1, 22-32-22, td 1840 ft, to deepen. Willett Oil Assn's Jack 2, 10-25-15, sd 3647 ft. Geo. Moss' Paso Robles 1, 27-26-13, rig. United Oil Co.'s No. 1, 2-32-21, rur. Birch-Royer Oil Co.'s Patchett 1, 33-31-13, td 1453 ft, recement 7th time, 16-in at 1440 ft.

TEHAMA COUNTY—Northern Counties Pet Co.'s Ewers-Mooney 1, 25-24-3, dr sand and shale 6500 ft.

TULARE COUNTY—Kenwood Pet. Corp.'s Kenwood 1, 14-24-27, dr sandy shale 1350 ft.

MONTEREY COUNTY—Shell's Branch 1, 34-24-10, td 7332 ft, r.

SANTA BARBARA COUNTY

CARPENTERIA—Santa Barbara O&G Co.'s Bryce 1, 29-4-25, sd 2100 ft.

LOMPOC—M. J. Freeman's La Brea 1, 11-7-33, sd 1450 ft. Lompoc Pet. Co.'s Beauterbough 2, 18-7-34, sd 3940 ft.

NO. MESA—Humphries et al's Edna May 1, 20-4-27, sd 1420 ft.

ORELLA—Williams & Brown's No. 1, 34-5-3, r g.

POINT CONCEPTION—Union's Sudden 1, 10-5-35, rig.

SANTA MARIA—Union's No. 1, 24-10-34, lcn.

SUMMERLAND—Marmonte Oil Co.'s No. 1, 16-4-26, sd 1600 ft.

VENTURA COUNTY

BARDSDALE—Bestco Pet. Co.'s Frey 1, 2-3-19, rur. Duke Oil Corp.'s No. 1, 7-3-19, td 2000 ft, co. El Rancho Oil Co.'s Elkins 1, 9-3-19, dr red shale and sand 2400 ft. Laing & Jacobs' No. 1, dr shale 1224 ft.

OJAI—Continental's Piru 2, 12-4-23, td 1017 ft, redrilled to 1017 ft, landed liner and perforated, swabbing oil and water.

OXNARD — General's McGrath 2, 26-2-23, rur.

PADRE CANYON—Continental's Hobson 1, 15-3-24, td 5501 ft, perf 6⅝-in 5240-5300 ft, swabbed wet, co.

PIRU—Bolsa Chica Oil Corp.'s Snow 3, 4-4-18, dr hard shale 570 ft.

SANTA PAULA — High Mesa Oil Co.'s Butcher 1, 16-4-22, sd 650 ft.

SHIELLS CANYON — Bankline Oil Co.'s Calumet B-2, 3-3-19, td 3674 ft, wocs 10¾-in at 3638 ft. Texas Co.'s Shiells 129, 4-3-19, dr hard sandy shale 2550 ft.

SIMI—Dawson Oil Co.'s No. 1, 8-2-17, sd 2300 ft. Jas. S. Hull's No. 1, 2-2-18, sd 1490 ft. Paloma Oil Co.'s Paloma Marr 1, 12-2-18, sd 2806 ft.

SO. MOUNTAIN—Calco Pet. Corp.'s Calco 3, 17-3-20, td 1320 ft, co.

TORREY CANYON—A. N. Macrate's Torrey 1, 32-4-18, td 4029 ft, co.

VENTURA—Ventura Explor. Co.'s Sexton 1, 30-3-22, sd 7068 ft.

SOUTHERN CALIFORNIA

ARTESIA—Engler & Long's Millard 1, 25-3-12, td 5888 ft, plug 5130 ft, cemented 8⅝-in at 4842 ft, swabbed water, trying to locate water.

CARBON CANYON—Tehama Pet. Corp.'s Kramer 1, 33-2-8, sd 3053 ft.

DOMINGUEZ — West American Oil Co.'s Del Amo 1, 3-4-13, dr hard shale 6064 ft.

EL SEGUNDO—L. J. Marvin's Woods 1, 7-2-14, td 6359 ft, co to 4740 ft.

HUNTINGTON BEACH—20th Century Oil Co.'s Calnan 1, 36-5-11, td 5160 ft, circulating.

KRAEMER—T. W. Cooke Dr. & Service Co.'s Cooke 1, 25-3-9, td 2657 ft, co. Leaseholders Dev. Co.'s Vejar 1, 26-3-9, sd 4110 ft. Standard Oil Co.'s Yorba Com. 1, 36-3-9, td 2714 ft, redrilled to 2589 ft, ran formation tester, recovered heavy oily mud, with better showings at bottom.

LAWNDALE — Sovereign Oil Corp.'s Ben Long 1, 22-3-14, td 8766 ft, plug 4960 ft, sd..

NEWHALL—Yant Pet. Corp.'s No. 5, 1-3-16, dr shale 1524 ft; No. 6, rur.

NEWPORT—Commander Oil Co.'s Mesa 1, 29-6-10, td 850 ft, 13⅜-in froze at 830 ft.

NO. LONG BEACH—Geo. L. Clayton's No. 1, 31-3-12, td 6765 ft, set 4½-in at 4750 ft, bailing.

PICO CANYON—N. M. Fraser's No. 1, 31-4-16, sd 955 ft.

PLACENTIA—Placentia Dev. Co.'s Verde 1, 35-3-9, td 4250 ft, redrilled to 3181 ft, sd.

PUENTE—Chas. R. Butler's Butler 1, 14-2-10, td 3230 ft, in oil sand, repairing boilers.

TOPANGA CANYON—Monarch Pet. Co.'s Sylvia Park 1, 5-1-16, td 650 ft, co.

TORRANCE—Eyer Pet. Corp.'s No. 1, 20-4-13, co 3138 ft. Oliver McDowell's No. 1, 35-3-14, sd 4635 ft. Pioneer Holding Co.'s Pioneer 1, 33-3-14, td 4317 ft, surveying hole.

VENICE—Eastern Oil Co.'s Del Rey Land Co. 1, 22-2-15, dr shale 4925 ft.

WEST LONG BEACH—Shell's Amebco 1, 13-4-13, dr sand and shale 5686 ft.

WESTMINISTER — Hillman-Long's Westminster 1, 14-5-11, rig.

YORBA LINDA—Continental's Carlton Com. 1, 21-3-9, dr hard shell, streaks tar sand 2337 ft.

RIVERSIDE COUNTY — Albert Pet. Co.'s Watt 2, 23-7-3, td 2787 ft. Wet, to replug. Fred E. Steven's Everett 1, 27-3-7, rur.

SAN BERNARDINO COUNTY—Equitable Pet. Explor. Co.'s No. 1, 11-10-5, td 1999 ft, bailed sand, water broke in, trying to locate water.

COLORADO

ADAMS COUNTY—Hills Dome Oil Lease, Hills 1, csl se se, to 4134 ft straightening crooked hole at 3977 ft.

ARCHULETA COUNTY — Wm. E. Hughes Estate Fee 4, se nw ne 24-33n-2e, sd 430 ft. Wm. E. Hughes Estate Fee 5, se nw se 24-33n-2e, spd.

CHEYENNE COUNTY—Stanley Brittall, Inc. Sipe 1, cne sw 26-12s-47w, mim.

GRAND COUNTY—Interstate Oil & Refining Co. Himman 1, ne se nw 11-2n-81w, sd with 8¼-in csg set at 1940 ft.

JACKSON COUNTY — Continental Oil Co. Hoye 3, nwc ne 34-9n-78w, sd until spring at 5038 ft.

LARIMER COUNTY—California Co. 1, se sw ne 6-11n-69w, sd 2530 ft.

MORGAN COUNTY—Swisher et al Lunt 1, sw sw sw 3-5n-60w, sd 1160 ft for repairs, td 1300 ft.

PARK COUNTY—South Park Oil Co. State 1, se se sw 16-11s-17w, dr 3736 ft and carrying 6¼-in csg.

PROWERS COUNTY—Trojan Oil & Gas Co., Lotus 1, nw¼ ne ne 15-23s-46w, sd 3400 ft.

FLORIDA

JACKSON COUNTY — Mrs. Mamie Hammonds et al's Grandberry 1, sw ne 15-5n-9w, wocs surf csg.

LAKE COUNTY—Oil Dev. Co. of Fla's Gulf Expl. Co. 1, se se 17-24s-25e, dr 2450 ft. Union Oil & Ref. Co.'s Gulf Expl. Co. 1, se sw 17-24s-25e, wocs 15½-in csg 65 ft.

KANSAS

BARTON COUNTY—Torrey & Feaster et al's Kempler 1, se ne ne 31-18s-11w, co 3441 ft. Yarnell, Carlson & Spencer's Bloomer 1, ne ne nw 36-17s-11w, td 3281 ft, pumped 92 bbls oil 3 hrs, to acidize. Morgan & Flynn et al's Amerine 1, ne ne ne 14-19s-14w, fsg 2530 ft. Morgan & Flynn et al's Zimmer 1, se se sw 30-19s-14w, dr 933 ft. Buchanan & Alexander's Langford 1, ne ne sw 14-20s-11w, dr 1875 ft. Earl Wakefield's Bumm 1, sw sw ne 22-19s-12w, mim. Hilligoss et al's Schmidt 1, ne ne ne 27-19s-11w, dr 218 ft. Simpson, Noble & Atlantic's Hiss 1, cnw ne 31-20s-13w, lcn.

BUTLER COUNTY—Pryor & Lockhart's Boucher 1, nw nw nw 19-17s-4e, td 2287 ft, D&A. National Ref. Co.'s McCullough 1, ne ne sw 1-28s-6e, td 3175 ft, pumped 107 bbls oil, comp.

COWLEY COUNTY—Aylward, Trees Oil Co. et al's Shields 1, sw sw sw 17-32s-6e, dr 3025 ft. Roth & Farrout's Sherwood 1, ne nw sw 11-31s-4e, td 3037 ft, 2600 ft oih, no test. Penwest's Clover 1, ne se se 8-31s-7e, so 2795 ft, co. Reed & Milligan's Houston 1, nw nw sw 10-31s-4e, sd 2648 ft. Winkler-Koch et al's Harlan 1-B, cs½ nw ne 13-31s-7e, sd 2550 ft. Earl Wakefield's Wilson 1, nw nw nw 4-32s-3e, ru. Shawver et al's Wilson 1, ne se ne 11-30s-4e, rum. Scroggins' Brady Estate 1, ne ne se 30-31s-3e, lcn. Roth & Farrout's Guthrie 1, se ne nw 30-33s-8e, fsg 835 ft. Morton et al's Roger 1, se se ne 1-31s-4e, mim. Mead Bros. et al's Orr 1, se se sw 23-31s-4e, mim.

ELLIS COUNTY — Parrish & Denman's Walter 1, se sw se 14-13s-17w, lcn. Blackwell O&G Co. et al's Solomon 1, se se sw 28-11s-19w, lcn. Twin Drilling Co.'s Reidel 1, sw sw ne 27-13s-16w, lcn.

ELLSWORTH COUNTY — Smith-Ash & Phillips Pet. Co.'s Splitter 1, sw sw sw 19-17s-9w, dr 465 ft.

GRAHAM COUNTY—Vickers Pet. Co. et al's Hutton 1, ne ne se 29-8s-22w, sd 1375 ft.

GREENWOOD COUNTY — Mohawk Oil Co.'s Edgar 1-A, ne ne sw 2-28s-8e, 1000 gals acid, no test. Dunn's Dawson 1, cnw ne 27-26s-13e, sd 925 ft.

HARPER COUNTY—Marathon Oil Co.'s Zellers 1, csw nw 17-35s-8w, dr stem test.

HARVEY COUNTY—Ok-Tex et al's Osborne 1, cse se 6-23s-3w, td 3679 ft, pb 2875 ft, D&A. Empire O&R Co.'s Webtser 1, se se sw 8-24s-2w, recement 15-in csg 360 ft, wocs. Harburney Oil Co.'s Schrag 1, nw nw se 24-22s-3w, sd 620 ft. Western Kansas O&R Co.'s Warkentin 1, csw sw 1-23s-2w, spd.

MARION COUNTY—Milton et al's Young 1, nw nw se 17-21s-3e, dr 800 ft.

NORTON COUNTY—Lario O&G & Elwell's Kennedy 1, sw sw nw 22-3s-23w, dr 3130 ft. Helmerich & Payne et al's Collins 1, cne ¼ 11-3s-25w, td 3675 ft, ru to dd.

PRATT COUNTY—Lario, Elwell & Atlantic's Lemon 1, se se nw 12-29s-13w, dr 3835 ft.

RENO COUNTY—McPherson Drlg. Co. & Derby Oil Co.'s Schuechzer 1, ne se sw 17-23s-4w, td 3391 ft, pot 689 bbls and 1 million ft gas, comp. Rose Springs Drlg. Co. & Foraker's Brauer 1, sw sw se 4-26s-4w, td 4113 ft, pb 2114 ft, 1200 ft oih. Derby Oil Co.'s Schrock 1, se se sw 27-24s-5w, td 3485 ft, no test. McPherson Drlg. Co. et al's Miller 1, se se ne 23-24s-5w, lcn.

RICE COUNTY—Permian Oil Co.'s Conner 1, cne ne 28-19s-7w, td 3640 ft, D&A. Skiles et al's Edwards 1, nw nw ne 3-18s-6w, td 3283 ft, pumped 550 bbls oil 20 hrs. Day's Mason 1, nw ne ne 26-21s-7w, td 3400 ft, swab 116 bbls oil 4 hrs. Vernon O&G Co. & Cusco Oil Co.'s Boldt 1, nw sw nw 10-19s-10w, ur 6-in csg 2909 ft. Gratton et al's Williams 1, sw sw nw 17-18s-7w, dr 1110 ft. Continental & Empire's Nickel 1, ne sw sw 13-18s-8w, cement cave 2120 ft. Duwe & Schneider's Wright 1, ne ne ne 36-21s-7w, spd & sd.

ROOKS COUNTY—Gillespie & Son's Lowe 1, ne ne nw 12-6s-18w, td 3162 ft, pb 3118 ft, ur 6-in csg. Murfin et al's Wasthusin 1, ne ne se 12-6s-18w, sd 970 ft. Pryor & Lockhart's Bradley 1, sw sw ne 31-10s-16w, dr 2525 ft.

RUSSELL COUNTY—Phillips Pet Co. & Sinclair Prairie's Driscoll 1, nw nw se 31-15s-11w, td 3407 ft. Coraleana Oil Co.'s Diskon 1, se se se 30-15s-13w, fsg 3000 ft. Warren Pet. Co.'s Bratton 1, se se se 25-11s-13w, sd 3385 ft. Central Pet. Co.'s Benso 1, se se sw 9-14s-15w, td 3091 ft, 5000 gals acid, pumped 215 bbls oil 20 hrs. Sam Murphy et al's Enochutz 1, sw sw sw 10-15s-13w, co 2565 ft. Hartman & Blair's Boxberger 1, nw nw sw 32-13s-14w, co 3045 ft. Empire et al's Major 1, se se se 11-14s-12w, dr 425 ft. Bridgeport Machine Co. & Lauck's Wyckoff 1, se nw ne 27-11s-13w, dr 1485 ft. Chas. Newbold's Krug 1, se sw se 4-15s-14w, ru. Hartman & Blair's Boxberger "B" 1, ne se sw 5-14s-14w, co 899 ft. Hartman & Blair's Johnston 1, nw nw nw 11-13s-14w, lcn.

SEDGWICK COUNTY—T. C. Johnson's Jensen 1, sw sw nw 11-28s-2e, dr 115 ft.

STAFFORD COUNTY—Herndon Drlg. Co. et al's Russell 1, cse nw 20-21s-14w, td 3788 ft, wocs. Farris et al's Snyder 1, se se nw 3-21s-11w, sd 2065 ft.

SUMNER COUNTY—Helmerich & Payne's Wright 1, se se nw 10-33s-2e, dr plug, sso. Morgan et al's Veail 1, se sw ne 27-32s-2e, dr 2315 ft.

TREGO COUNTY—Vickers Pet. Co. et al's Secor 1, nw nw nw 25-15s-24w, dr cement. Central Commercial's Wagg 1, nw nw se 17-13s-21w, ur 5-in csg 3845 ft. Continental Oil Co.'s Holcomb 1, ne se nw 26-11s-23w, ru.

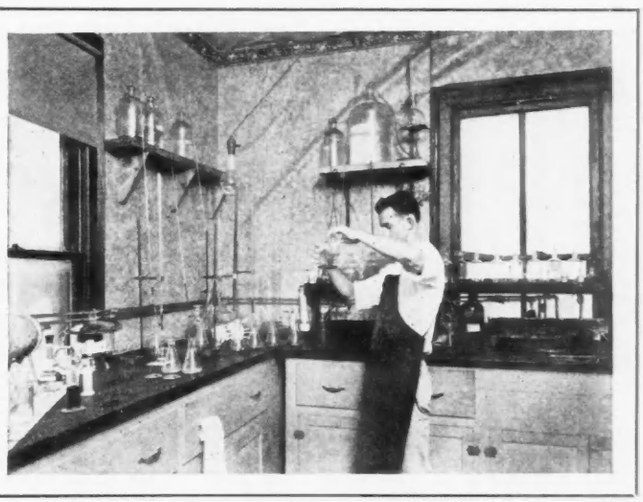
WOODSON COUNTY—Morgan et al's Vermont Savings Bank 1, ne nw ne 15-25s-14e, sd 1610 ft. Sheedy et al's Warner 2, sw sw sw 21-25s-14w, td 1500 ft, pb 1460 ft, co. Sheedy's Baker 1, se se nw 2-26s-14e, rig.

NORTH LOUISIANA

BIENVILLE PARISH—Gulf Oil Corp.'s W. T. Thiasher 1, sw sw 13-15n-7w, core 1925 ft. Lide & Greer's Davis Lbr. Co. 1, ne se 12-16n-5w, top Nacatosh 2395 ft top hd chalk 2528 ft base Annona chalk 2850 ft, top Blossom 2792 ft, dr 4850 ft gray shale. Texas-Seaboard Oil Co.'s McGee 1, sw ne 3-16n-16w, elev 217 ft, top Arkadelphia 1980 ft 10¾-in csg 2299 ft, top anhydrite 4992 ft massive anhydrite 5240 to 5450 ft, sd 5550 ft lime.

BOSSIER PARISH — L. R. Baker et al's Bulkley 1, ne sw 36-21n-13w, dr 2076 ft. Producers O&G Co.'s E. C. Edwards 1, se sw 27-18n-11w, sg 2780 ft dr 3100 ft hd lime. United Gas Pub. Serv. Co.'s Muriff A-1, 17-17n-11w, rur.

CLAIBORNE PARISH—Wm. C. McGloth-



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lin's Brinker 1, sw se 10-23n-4w, spd wocs 10-in surf csg 280 ft dr 300 ft. E. T. Oakes et al's Patton Est. 1, ne ne 1-20n-5w, fsg td 4238 ft. Ryan Oil Corp.'s Gladney 1, ne sw 27-20n-7w, elev 343 ft anhydrite 4485-4960 ft co to deepen to 5200 ft td 5024 ft. Sugar Synd. et al's Darrett 2, 31-21n-5w, fsg, td 5660 ft sandy lime. Kilpatrick 1, sw ne 7-19n-5w, owdd.

DESOTO PARISH—Alexander et al's Stell 1, 5-12n-16w, elev 245.6 ft top stringer anhydrite 4960 ft dr 5175 ft. V. T. Bolin et al's McMichael 1, nw se 26-13-15, dk. A. G. Halbach, Tr's Staten 1, 32-13-14, sd 3305 ft.

JACKSON PARISH — Caldwell L&T Co.'s Burroughs Est. 1, ne nw 1-17n-1w, rur.

LA SALLE PARISH—H. L. Hunt, Inc.'s La. Cent. Lbr. Co. 1, 33-10n-3e, dry abn 2000 ft.

LINCOLN PARISH — Ark.-La. Gas Co.'s Causey 1, nw ne nw 32-19n-2w, dk Caldwell L&T Co.'s Hammons 1, nw ne nw 30-18n-1w, wocs 15½-in surf csg, Lide & Greer's S. Gardner 1, 10-17n-4w, 10-in csg 2386 ft dr 3402 ft shale.

MOREHOUSE PARISH — Henry E. Rondeau et al's Clark 1, sec 10-20n-7e, dk & mir.

RAPIDES PARISH—Amerada Pet. Corp.'s Beasley 1, nw nw 52-1n-2e, wocs surf csg. Foster Oil Co.'s Hogan 1, 2-1n-2e, rur. Texas Co.'s Weil 1, 52-1n-2e, rur.

SABINE PARISH—A. H. Tarver's Baker 2, 36-8n-12w, top marl 2205 ft dr 2305 ft chalk.

UNION PARISH—Lent. Bocher & Sears' Frost Lbr. Co. 1, nec 27-21n-1e, spd.

WEBSTER PARISH—Ohio Oil Co.'s R. L. Holloway 6, ne sw 23-21n-10w, 15¾-in csg 360 ft gas blowout 5540, killed with baroid, cemtd 10¾-in csg 5380 ft, coring 5566 ft.

WINN PARISH—P. E. Parsons et al's Tremont Lbr. Co. 1, nw sw 10-12n-2e, elev 209.4 ft top Wilcox 1280 ft. Midway 2825-3470 ft, base Annona chalk & top Ozan 3875 ft dr 4065 ft hd shale.

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SOUTH LOUISIANA

ACADIA PARISH—Superior's M. Savoy 1, Bayou Mallet prospect, sec 47-7s-1e, abd 8027 ft.

CALCASIEU PARISH—Fred Oil Co.'s Faist 1, sec 26-8s-10w, dr shale 4308 ft. A. G. Oliphant's Calcasieu National Bank 1, Nibbletts Bluff prospect, sec 23-10s-12w, dr shale 870 ft. Union Sulphur Co.'s Prairie Farms 2, South Lake Charles prospect, sec 2-11s-9w, dr shale 8029 ft.

CAMERON PARISH — Magnolia's Miama Cooperation Co. 1, Willow Lake prospect, sec 32-12s-8w, dr shale 5896 ft.

EVANGELINE PARISH—Basile Oil Co.'s Hirsch 1, sec 14-6s-2w, dr sand 8415 ft.

IBERIA PARISH—Jefferson Lake Oil Co.'s Lake Pigneur 274, Jefferson Lake prospect, sec 12s-5e, dr sand 8475 ft in sdtr hole, showing oil.

JEFFERSON DAVIS PARISH—Shell's Lacassine 1, Hayes prospect, sec 20-11s-5w, coring hard shale 9445 ft.

PLAQUEMINES PARISH — Southern Sulphur Co.'s Manhattan Fruit Co. 1, Venice dome, sec 26-21s-30e, dr shale 3501 ft.

ST. BERNARD PARISH — Emerald Pet. Co.'s Shell Beach Properties 1, Shell Beach prospect, sec 31-13s-15e, sd 6316 ft.

ST. JAMES PARISH — Shell's Colonial Sugar Inc. 1, Convent prospect, sec 5-12s-5e, dr shale 3773 ft.

ST. MARTIN PARISH — Texas Co.'s St. Martin Land Co. 8, Henderson prospect, sec 9-8s-7e, dr shale 5404 ft.

TERREBONNE PARISH — Shell's Realty Co. 1, Houma Townsite prospect, sec 103-17s-17e, dr shale 9395 ft.

VERNON PARISH—Llano Cooperative Oil Corp.'s Llano F, sec 7-1n-9w, sd 2855 ft.

WEST FELICIANA PARISH — Southern Minerals Corp.'s M. B. Wood 1, 10 mi nw St. Francisville, sec 54-1s-4w, fsh 1138 ft.

MICHIGAN

ALCONA COUNTY—Thalman and Morris' Kohlman 1, 26n-7e-10, sd 2540 ft.

GLADWIN COUNTY—Goll, Graves, Mechling's Kent 1, 17n-1e-23, dr 1100 ft. Sun Oil Co.'s Reed 1, 17n-2w-12, dr 350 ft.

GRATIOT COUNTY — Harley William's Smith 1, 9n-2w-29, dr 800 ft. Mountain Oil and Gas Co.'s Walters 1, 11n-2w-17, dr 1295 ft.

IONIA COUNTY — Associated Petroleum Co.'s Retensdorf 1, 7n-8w-8, sd 2700 ft. Wittmer Oil Co.'s Kimball 1, 7n-5w-15, sd 2550 ft.

KENT COUNTY—Rex Oil Co.'s Johnson 1, 10n-1w-36, sd 1200 ft. James Barton's Smith 1, 10n-10w-29, fsg 750 ft.

LENAWEE COUNTY — Socony-Vacuum Co.'s McCarberry 1, 5s-5e-36, 5 in csg collapsed, fsg, hole standing full of oil after shot in Trenton, td 2540 ft. Mott and Denman's Huffman 1, 6s-3e-26, sd 125 ft.

MASON COUNTY—Dragoon Development's Young 1, 17n-15w-15, sd 2550 ft. Max Prey's Barothy 1, 17n-13w-29, csg 5 inch 2475 ft, dr 2480 ft. Northern Development Co.'s Burke 1, 17n-15w-26, dr 100 ft.

MIDLAND COUNTY—J. V. Wicklund's Roher 1, 16n-1w-7, rig.

MONTCALM COUNTY—Jetter Oil Co.'s McCracken 1, 9n-5w-6, ru. Starr Petroleum Co.'s Ward 1, 9n-5w-20, dr 400 ft. Old Dutch Oil Co.'s Hansen 1, 10n-7w-21, dr 2900 ft; Russell 1, 10n-6w- sw se sw-29, lcn. John F. Martin's Christensen 1, 10n-6w, se se nw 20, lcn.

SAGINAW COUNTY—Chas. Bell's Wegner 1, 11n-2e-10, rig. St. Louis Pipe and Supply Co.'s Yadovack 1, 10n-2e-13, dr 1000 ft. Mid State Development's Burlson 1, 10n-5e-21, rig. Pure Oil Co.'s Blumer 1, 12n-1e-10, dr 2200 ft. Henry McEvoy's Jenacki 1, 12n-2w-31, dr 990 ft.

SHIAWASSEE COUNTY—Frank C. Cheer's Wilson 1, 6n-3e, ne nw ne-34, lcn.

TUSCOLA COUNTY—Bancroft Oil Co.'s Humes 1, 11n-8e-21, rig. Muskegon Development Co.'s Casey 1, 12n-10e-nw nw sw-9, lcn. Smith Petroleum Co.'s McComb 1, 10n-8e, nw sw se, 31, lcn.

MISSISSIPPI

HARRISON COUNTY—Big Ridge Oil Co.'s Hingen 1, se se 13-7s-10w, dr 2200 ft.

JONES COUNTY—Snow Black Pet. Co.'s Fox 2, 31-7n-12w, spd & sd.

LAMAR COUNTY—Snow-Black Pet. Co.'s Miller et al 1, ne ne sw 3-4n-15w, dk & mir.

WARREN COUNTY—Harry W. Elliott et al's R. L. Parker 3, 14-14n-1e, 6-in csg 2941 ft sd for more liner, td 3140 ft.

WILKINSON COUNTY—Chas. Green, Tr's Foster Creek Lbr. Co. 1, c se 8-3n-1e, 10¾-in csg 615 ft ran electrical tester, sd 5038 ft.

WINSTON COUNTY—Jack Vale's Moody 1, sw nw sw 3-13n-14w, elev 540 ft 6-in csg 2216 ft sd 3004 ft.

MONTANA

FERGUS COUNTY—Emmons et al 1, csw se 20-21n-18e, dr 496 ft. Fenholt et al 1, se nw sw 24-21n-17e, dr 118 ft.

TETON COUNTY—Teton Oil Co. (Jerome Drumheller et al) Reickoff 1, cne sw 14-24n-5w, sd 2180 ft.

NEW MEXICO

LEA COUNTY—Amerada's State 1-K, c se nw 29-19s-37e, east edge Monument area, elev 3617 ft, base salt 2440 ft, dr 3600 ft. Barnsdall Oil Co. et al's D. C. Hardy 1, c se ne 29-21s-37e, elev 3470 ft, base salt 2420 ft, sg 2945, 3227 and 3254 ft, dr 3290 ft. Crafton Oil Co.-Amon G. Carter's M. A. Hair-Humble 1, c sw nw 11-24s-37e, elev 3231 ft, top anhydrite 990 ft, top salt 1220 ft, base salt 2455 ft, cem 7-in cas 3444 ft, co to shoot, td 3755 ft. Culberson-Irwin & Roy Stovall's J. B. Humphrey-Humble 1, c se sw 3-25s-37e, machine; John R. Stewart-Repollo 1, c sw se 10-25s-37e, dr 615 ft. Gulf Oil Corp.'s Annie L. Christmas 1, c se se 27-22s-36e, elev 3521 ft, est. 5,000,000 ft d y gas on dst 3209-3363 ft, dr 3400 ft; H. C. Collins 1, c se nw 14-21s-36e, elev 3568 ft, dr 1215 ft. Harry Leonard et al's B. T. Lanehart-Humble 1, c sw ne 21-25s-37e, elev 3079 ft, top anhydrite 965 ft, dr 1250 ft. Maljamar O&G Corp.'s M. E. Baish 6, c nw se 21-17s-32e, Maljamar area, dr 2165 ft. Ohio Oil Co.'s State-Elliott 1, c nw se 30-19s-37e, elev 3621 ft, dr 200 ft. Plains Production Co.'s Risbie L. Mosley 1, c nw se 34-23s-37e, rust; Geo. Smith-Humble 1, c se se 4-25s-37e, machine. Repollo Oil Co.'s J. H. Williams 1, nec 33-19s-37e, east Monument area, elev 3587 ft, base salt 2530 ft, rust at 3800 ft, sd for repairs with 900 ft oil and water in hole, td 4010 ft; Annie L. Christmas 1, nec ne sec 28-22s-37e, mim. Republic Prod. Co.'s B. Davis 1, c sw sw 34-23s-36e, n Cooper area, lcn. Skelly Oil Co.'s J. U. Baker 1, c se sw 22-22s-37e, elev 3348 ft, dr 2960 ft; A. L. King 1, c se nw 4-23s-37e, rig; B. L. King 1, c sw se 32-22s-37e, elev 3369 ft, dr 2860 ft; W. H. King 1, c ne sw 6-23s-37e, elev 3382 ft, top anhydrite 1310 ft, base salt 2684 ft, dry and abnd in sulphur w in lime 3915-17 ft; Hugh O. Simms 1, c sw ne 4-23s-37e, elev 3323 ft, shot 370 qts nitro 3474-3677 ft, td 3687 ft, flowed 168 bbls oil 18 hrs and 130 bbls next 24 hrs and 2,000,000 ft gas daily, run tubing; R. R. Simms 1, c se se 4-23s-37e, elev 3306 ft, dr 3250 ft; Edgar L. Steeler 1, c nw ne 17-23s-37e, elev 3333 ft, pb fr sulphur w at 3800-10 ft to 3783 ft, used 2000 gals acid and swabbed 15 bbls oil and 60 bbls w 10 hrs, pb to 3773 ft and sd for shot. Skelly et al's B. F. Harrison 1, c nw sw 5-23s-37e, elev 3352 ft, top anhydrite 1190 ft, top salt 1290 ft, pb fr sul w in lime 3796 ft to 3762 ft, shot 870 qts 3491-3754 ft, set liner and tubing, swabbing oil. Warren L. Todd, Inc. et al's Lemon 1, c nw se 17-21s-32e, dr 2010 ft. Sam K. Vierson & Brown's W. D. Robinson 1, c nw se 14-11s-32e, elev 4355 ft, top anhydrite 1474 ft, top salt 1506 ft, top brown lime 3465 ft, cem 7-in cas 3680 ft, preparing to dry and abd, td 4755 ft.

OKLAHOMA

ALFALFA COUNTY—Tex-O-Kan's Acre 1, csw ne 14-24n-11w, sd 7325 ft.

BEAVER COUNTY—Anderson-Kerr et al's Davis 1, csw se 36-5n-26 ECM, sd 6794 ft, to pb.

BECKHAM COUNTY—Wood Pet. & Royalty Corp.'s Blair 1, nw nw se 32-9n-26w, dr 1670 ft.

CADDO COUNTY—Denver P&R Co.'s Sah-Cam 1, cse se 33-10n-10w, dr 9990 ft.

CARTER COUNTY—The Texas Co.'s Cathey 1, se ne ne 6-5s-1w, td 4164 ft, set 35 bbls oil. Carter Oil Co.'s Humble-Williams 1, sw ne sw 27-2s-3w, dr 7303 ft. Southern States Oil Co.'s Moore 1, ne se nw 30-4s-1w, dr 614 ft. Schermerhorn Oil Co.'s Floyd Clowdus 1, nw nw ne 2-4s-2w, dr 956 ft. Carter Oil Co. et al's Leon Voorhees 1, cse sw 34-5s-2w, lcn.

COAL COUNTY—Shell Pet. Corp.'s Hill 3, se se nw 30-3n-10e, dr 3562 ft.

COMANCHE COUNTY—George Pace et al's Spencer 1, sw sw sw 21-3n-10w, dr cement 1680 ft. John Nicholas' Hauseholder 1, ne ne sw 8-2n-10w, sd 960 ft. J. Phillips' Head 1,

cn¼ nw sw 29-4n-11w, ru and sd. Mieling's Miller 1, ne ne sw 23-4n-12w, sd 530 ft. McCasland et al's Smith 1-A, sw sw sw 12-2n-10w, dr 50 ft.

GARFIELD COUNTY—Sherry et al's Hoken 1, nw nw sw 32-20n-4w, dr 4303 ft. Stanolind-Amerada's Brunken 1, sw sw ne 32-23n-4w, rig. Herndon Drlg. et al's Branson Community 1, sw sw se 23-24n-3w, rur.

GARVIN COUNTY—Suggett & McElreath's Hyre 1, ne ne se 23-3n-1w, dr 3718 ft.

GRANT COUNTY—Southern Oil Co. et al's Allen 1, sw sw se 36-26n-4w, sd 5505 ft.

HUGHES COUNTY — Schumacher et al's Schumacher 1, ne nw ne 23-5n-10e, sd 1610 ft. Halsey's Eastep 1, nw nw sw 11-8n-9e, td 3454 ft, pb 3412 ft. Canavan's Meadors 1, ne se sw 5-8n-10e, wocs at 3066 ft. Phillips Pet. Co.'s Eberle 1, ne ne sw 12-5n-9e, mit.

JACKSON COUNTY—Universal Oil Co.'s Briscoe 1, nw sw ne 36-1s-20w, dr 1350 ft. Jackman's Fee 1, sw sw sw 27-1s-24w, sd 1770 ft.

JEFFERSON COUNTY—Heydrick's Seay 1, se nw nw 31-6s-5w, td 2107 ft, D&A. Sinclair Prairie's Barrett 1, nw nw nw 31-5s-6w, dr 2180 ft. Campbell's Trout 1, se ne ne 6-8s-7e, td 1314 ft, mi larger tools.

KAY COUNTY — Black Gold Pet. Co.'s Cooley 1, ne nw sw 25-28n-4e, sd 875 ft.

KIOWA COUNTY—Beeler & Klein's VanKirk 1, ne ne sw 35-7n-15w, sd 607 ft. Bruns & Moore's Webster 1, cne ne 2-6n-17w, sd 458 ft. Shaffer et al's Slusher 1, nw sw nw 35-7n-17w, dr 75 ft. Beeler & Kline's E. VanKirk 1, sw nw se 35-7n-15w, dr 38 ft. W. C. Adams et al's Stone 2-A, se se ne 34-7n-17w, running 6⅝ in csg 890 ft.

LE FLORE COUNTY—McGraw et al's Tidwell 1, cnw se 17-3n-22e, dr 1300 ft.

LINCOLN COUNTY — Stanolind-Amerada's Crawford 1, ne ne se 35-15n-2e, td 5243 ft, pb. The Texas Co.'s Andrew 1, nw ne se 28-14n-5e, td 4188 ft, pb 3925 ft, prod 2 million ft gas, comp. Fred McDuff's Jacob 1, ne ne se 10-15n-5e, sd 2070 ft.

LOGAN COUNTY — Stanolind-Amerada & Eason's Gragg 1, sw sw ne 20-18n-4w, fsg 5991 ft.

LOVE COUNTY—Sinclair Prairie's Stockton 1, se se sw 26-6s-2w, dr pipe stuck 6348 ft. Russell et al's Scott 1, sw se sw 29-8s-2e, dr 1844 ft. Amerada & Stanolind's Westheimer 1, sw se sw 27-6s-2e, dr 5871 ft.

MARSHALL COUNTY—Singley's Vickers 1, nw sw nw 22-7s-4e, sd 245 ft. Singley et al's Halford 1, sw se sw sw 22-7s-4e, sd 400 ft. Smith's Chestnut 1, ne ne ne 23-8s-5e, dr 350 ft. Elmir-Gill-Lidecker 1, se se nw 7-8s-6e, dr 498 ft.

McCLAIN COUNTY — Arab Pet. Corp.'s Autry 1, nw nw nw 16-7n-3w, td 6889 ft, wocs.

McINTOSH COUNTY—I.T.I.O. Co.'s Toncred 1, sw sw ne 9-9n-14e, dr 3302 ft.

OKFUSKEE COUNTY—Sherry's Washington 1, sw sw ne 21-13n-7e, 9 million ft gas, si. Manahan & Grisso's Dalton 1, se se se 36-10n-8e, td 1740 ft, rust.

OKLAHOMA COUNTY—Sinclair Prairie's Corbett 1, ne nw ne 17-13n-3w, td 6477 ft, running Eastman survey. Sinclair Prairie's Heavey 1, ne ne nw 17-13n-3w, dr 6865 ft.

PAYNE COUNTY—Pierce's Kiheag 1, sw sw sw 7-17n-1e, dr 2620 ft.

PONTOTOC COUNTY—Gypsy Oil Co.'s Emry 1, sw sw ne 15-2n-6e, td 6011 ft. Mid-Texas Pet. Co.'s Harbet 1, sw sw se 30-5n-4e, spd and sd. Patsy Oil Co.'s Magnuson 1, sw se se 23-2n-7e, td 4270 ft, to run 7-in csg.

POTTAWATOMIE COUNTY — Magnolia Pet. Co.'s West 1, sw nw se 22-6n-4e, dr stem at 3735 ft.

ROGER MILLS COUNTY — Anderson & Kerr et al's Teeter 1, cse se 2-17n-25w, sd 6503 ft.

SEMINOLE COUNTY—Felmlee & Nichaelson's Belford 1, se nw ne 15-9n-8e, dr 1680 ft. Wood Oil & Dirickson's Ellis 1, nw ne ne 36-9n-5e, woc at 52 ft. Amerada et al's Community Stout 1, ne ne sw 3-10n-5e, mit.

STEPHENS COUNTY—Clyde Rhodes et al's Doak 1-A, sw sw sw 1-1s-5w, sd 400 ft.

TILLMAN COUNTY — Gulf Oil Corp.'s Wearmouth 1, se nw se 31-1s-16w, set 10-in csg 1202 ft, td 2970 ft, wocs.

EAST TEXAS

ANDERSON COUNTY—Burke Bros. et al's S. G. Moore 1 (36.3-ac), J. C. Rosson sur, Camp Hill area, lcn. W. R. Adams et al's J. Lozica 1 (5-ac), John Adams sur, Long Lake area, lcn. Sun Oil Co.'s Carl Rosson 2 (110-ac), W. T. Davis sur, Camp Hill area, elev 589 ft, dr 3815 ft. Comer E. Todd et al's W. T. Todd 1 (100-ac), A. B. Patton sur, Boggy Creek field, sd 1400 ft. Tide Water & Seaboard Oil Corp.'s M. J. Reagan 1 (214.8-ac), John Adams sur, Long Lake area, elev 244 ft, Pecan chalk 3546-3730 ft, Austin chalk 4625-4886 ft, top gas sand 5262 ft, td 5299 ft, testing; Shaw & Cern 5 (1216-ac), Daniel Parker sur, Long Lake area, dr 4265 ft. Standard Oil Co. (Kan.'s) B. Hombs-Robinson 2 (57½-ac), John Adams sur, Long Lake area, lcn.

CASS COUNTY — American-Liberty Oil Co.'s D. A. Maxcy 1 (86-ac), John Collum sur, Rodessa area, sp; Marcus Rambo 1 (86-ac), J. H. Rives sur, mim. R. W. Norton, Tr.'s Mary Rives 1 (85-ac), John Collum sur, w Rodessa field, elev 277 ft, chalk 1895-2485 ft, top Red Beds 3394 ft, top anhydrite 5043 ft, top Hill sand 5606 ft, top Gloyd 5815 ft, dr 6000 ft. T. H. McElvain et al's C. M. Beckett 1 (7.62-ac), John Collum sur, w Rodessa field, lcn. United Production Corp.'s J. R. Jones 1 (70-ac), B. J. Murray sur, west Rodessa area, cem cas 323 ft; J. R. Jones 2, elev 207 ft, top chalk 1935 ft, dr 2200 ft.

COLLIN COUNTY—Port Bolivar Oil & Ref. Co.'s Clarkston-O. G. Durning 1-A (140-ac), Wm. Creager sur Pat. No. 1193, elev 722 ft, sd 3866 ft; J. Shirley 1-A, James Sorrell sur, Pat. No. 3609, (first hole jkd at 1963 ft), will skid rig.

FREESTONE COUNTY—J. P. Haley & C. F. W. Young's Jack Eppes 1 (18-ac), David Bullock sur, 8½ mi se Teague, elev 471 ft, top Pecan chalk 2965 ft, Austin chalk 3761-4143 ft, sd to test Woodbine sand 4556-61 ft.

GRAYSON COUNTY—Olson Drlg. Co. et al's SW Life Insurance Co. 1 (160-ac), J. C. Jamison sur, A-865, 3 mi n Pottsboro, elev 767 ft, Trinity series fr surface to 850 ft, Springer shale 850-1240 ft, Mississippian Caney shale 1240-4308 ft, fine grained sand 4308-4482 ft (with odor o&g 4441-82 ft), chert 4482-4637 ft, top Woodford shale 4637 ft, lost dp 4670 ft, pb to 3535 ft, re-drl 4055 ft. Port Bolivar Oil & Ref. Co.'s Creed Taylor 1 (160-ac), J. Fitzhugh sur, 3 mi se Gunter, sd 3931 ft.

HENDERSON COUNTY—W. McDougal et al's E. Price 1 (216-ac), M. Mathews sur, lcn. L. V. Marmar et al's I. W. Brown 1 (18¾-ac), R. H. Pearson sur, nw Cayuga, dk. Sparks et al's Theo. E. Berry 1 (167.8-ac), Aaron York sur No. 847, 5 mi s Brownsboro, mim and sd. H. M. Wilson et al's fee 1 (943-ac), Thomas Caro sur, 5 mi e Malakoff, elev 359 ft, sd 2800 ft.

KAUFMAN COUNTY—C. C. Pearson et al's G. W. Martin 1 (100-ac), W. F. C. Butler sur, elev 429 ft, Austin chalk 1940-2200 ft, sd 2402 ft.

LAMAR COUNTY — Bruce Bros. et al's Chas. Price 1, Wm. Nelson sur, 1 mi w Trout, elev 484 ft, sd 326 ft. North Texas

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Synd.'s D. M. Haynes 1, J. R. Craddock sur, 2½ mi nw Emerson, dk. Portland Oil Co.'s J. M. Johnson 1 (96-ac), Luke Roberts sur, 1 mi w Deport, dr 1010 ft.

LIMESTONE COUNTY—C. F. Lytle et al's J. L. Thompson 1-T (141-ac), Pedro Varella sur, w Mexia field Trinity test, dr 2255 ft. Montre Oil Co.'s Bill Rosson 1, blk 4, Pedro Varella sur, old Nigger Creek area, dr 1115 ft.

MORRIS COUNTY—Raycotuck, Inc.'s P. M. Staggers 3 (40-ac), J. D. Nelson sur, dr 2615 ft. Steve J. Rotundi et al's W. & C. Smith 1 (50-ac), M. C. Vela sur, 2½ mi sw Naples, top Navarro chalk 2258 ft, dr 3910 ft.

NAVARRO COUNTY—E. M. Thomason & Co.'s Estes Bros. 1 (58-ac), blk 11, Wm. Gilbert sur, 1 mi e Roane, top broken Austin chalk 1700 ft, top hard chalk 1750 ft, sd 1823 ft.

RAINS COUNTY—W. A. Allen, Geo. McClung et al's Ida Bullard 1 (75-ac), Nancy Brantley sur, 2 mi sw Emory, sd 117 ft.

RED RIVER COUNTY—J. S. Abercrombie Co. & Harrison Oil Co.'s T. L. Knight 1 (231-ac), Robt. Hill sur, 13 mi n Clarksville, sd 550 ft. Annona O&G Co.'s Leo & Otto Roberts 1 (200-ac), James Bankston sur, 2 mi ne Annona, sd 160 ft. Garson & Seigel's W. T. Morris 1 (351-ac), Joseph Guest sur, 1 mi s Detroit, elev 478 ft, sd 825 ft.

RUSK COUNTY—McCallum et al's E. C. Gary 1 (265-ac), John Piburn sur, 5 mi s Henderson, elev 338 ft, dk. J. W. Shipman et al's Citizens Nat'l Bank (L. T. Burton) 1-A (125-ac), J. J. Y'Barbo sur, 4 mi ne Henderson, elev 432 ft, fsh 3467 ft.

SMITH COUNTY—W. L. Cloud et al's Dora Kendall 1-A, John Williams sur, 3 mi e Van field, sd 180 ft. Frank D. Staples-Edgar Hart et al's Luther Hale 1 (115-ac), T. C. Williams sur, 3½ mi nw Arp, elev 504 ft, top Pecan chalk 2934 ft, dr 3215 ft. Winona Oil Corp.'s McClung 1 (23½-ac), E. Newberry sur, 1 mi e Winona, sd 1165 ft. O. G. Sanders et al's Winona State Bank 1 (471-ac), Sam Epps sur, ½ mi n Friendship, dr 2980 ft.

TITUS COUNTY—C. N. Housh, Thompson & Bob Peveto's C. M. Carr 1 (108-ac), (north) M. V. Delgado sur, 1½ mi e Talco, elev 370 ft, Pecan chalk 1611-1788 ft, top soft Austin chalk 3011 ft, top hard chalk 3032 ft, top Woodbine series 3436 ft, Del Rio clay 3866-3962 ft, top Georgetown lime 3962 to 4190 ft, Paluxy sand 4190-4208 ft, showed oil and gas on dst 4166-4208 ft, sd to cem 8¼ in cas 4161 ft. Magnolia's C. M. Carr 1, M. V. Delgado sur, lcn. C. M. Joiner et al's Huernish 1, Henry P. Banks sur, 12 mi e Talco, dk.

WOOD COUNTY—Gulf Prod. Co.'s C. D. McCollum (Stone) 1, (39.6-ac), Joseph Simpkins sur, ¼ mi s Alba, elev 456 ft, Pecan chalk 2370-2612 ft, Austin chalk 3700-3928 ft, trace oil 3956-60 ft, top Woodbine series 4381 ft, top sand 4402 ft, tested sw 4405 ft, top Red Beds 4457 ft, top Georgetown lime 5175 ft, dry and abd 5200 ft.

SOUTH TEXAS

ARANSAS COUNTY — Buckingham Oil Co.'s McCampbell 1, lots 8 and 9, sec 41; lots 8 and 9, sec 42, McCampbell Subd, James Orick survey, 2 miles nw of Aransas Pass, 8 ft fr San Patricio County line, dr 4330 ft.

ATASCOSA COUNTY—R. C. Lee, Trustee (Atascosa Trust), U. A. Doumch 1, 152-ac tr, blk 10, J. T. Russell sur No. 1222, 3 miles n Poteet, dr 1610 ft. R. McIntyre's San Antonio Joint Stock and Land Bank (H. A. Billinck) 1, J. B. Woodleff sur No. 246, 7½ mi e Coughran, dr 3187 ft. L. L. Motes, Trustee's Atascosa Co. subd 1, 425-ac tr, John McNeil Sur No. 1191, sd 894 ft.

BASTROP COUNTY—Franklin et al's Betty Lawhon 1, Standifer sur sw of Elgin, dk. G. B. Peterman's Z. C. Hemphill 1, Bymar sur, sd 2329 ft, chalk. A. W. Phillips' Vaughn Lumber Co. 1, 1110-ac tr, F. Sartuche sur No. 10, 5 mi ne Bastrop, sd 154 ft.

BEE COUNTY—Geo. M. Church's Webb-Hearn 1, in 92-ac lease, E. Ryan sur, 2000 ft se disc well Beeville field, 5935 ft, set 7-inch casing to bottom, perf 5900-14 ft, show some gas, oil and sw. G. A. Ray 1, Anna Burk sur, 2 mi e Beeville, sd 692 ft. Dirks Bros.' J. R. Scott 1, J. Molina sur, but in J. M. Uranga gr, 1 mi se Normana, dr 3333 ft, sticky shale. H. A. Pressey's R. T. Ricks 1, 1120-ac tr, Jose M. Uranga gr, ab 668, 4½ mi s of Normanna, spud in. G. M. Richardson et al's Mengers 1, center w 100-ac of W. R. Ryan 500-ac tr. Wm. Allen sur, near Tynan, pits dug to wait on rig.

BEXAR COUNTY — American Gas Co.'s Oliver No. 5, 400-ac tr, M. F. Rodriguez sur, Gas Ridge, td 2996 ft, set 6⅝ csg 2250 ft, bad cement job, recemented. N. Anderson's Henry Fest 1, 18.75-ac tract, Rolen League & Labor survey No. 88, dr 210 ft, shale. Tom Anderson's C. J. Krause 1, sd 105 ft. Carter & Ingersoll's Louis Mann 1, 60-ac tr, John Christopher sur, 3 mi s Von Ormy, sd 803 ft. J. B. Chew et al's Frank Bonkowski, 150 ft nl and wl of 129.8-ac tr, Wm. McMinener sur, section 10, dr 70 ft on 1250-foot contract. Crouch & Shadrock's W. Kohler 2, 88-ac tr, A. M. Baerrera sur No. 58, dr 100 ft. Joe Deupree's R. S. Coffey 1-A, F. Rodriquez sur, 7 mi s San Antonio, td 1200 ft, showed some water, oil and gas, recementing at 1059 ft. Wm. H. Russell 1, 723-ac tr, Fernando Rodriquez sur, 9 mi ne San Antonio, deepened fr 1001 ft to 1075 ft, well flowing, 16 grav oil. H. J. Moore's Mrs. Lena Eisenhauer 1, 80-ac tr in Gertrude Rodriguez sur, 9 mi ne of San Antonio, dr 415 ft. O. M. Owensby's Minna Coreth 1, 284.04 ac tr, Adam Stafford sur No. 49, near Eckert field, sd 1240 ft, had gas show. H. A. Pagenkopf's Chas. Rittiman 1, 100-ac tr, J. Chappal sur, 12 mi ne San Antonio, near Kirby, top Edwards lime 1110 ft, dr 1617 ft. W. A. Schaefer Co.'s P. J. Coimperlik 1, 450 ft wl, 300 ft sl of 102-ac tr, J. M. Bustillos sur, 16 mi e S. A., dk. H. B. Schumacher's Hilda Gillette 1, 49-ac tr in M. G. de Alamiz sur No. 20 and 7 mi south of San Antonio, dr 105 ft, shale. Trawalter & Umburn's Juan Escalera 1, 150 ft e of river, 150 ft n of sl, 213-ac tr, Francisco Ricardo survey No. 6, lcn.

BLANCO COUNTY—R. T. Rowe & W. E. Nixon's Polk Morrisey 3, 222-ac tr, Thomas Webb sur No. 91, 3 mi e of Blanco, sd 212 ft.

BROOKS COUNTY—The California Co.'s B. Garcia 1, tr No. 3, Las Mestina de Gonzalina gr, Alta Mesa dist, td 3262 ft, cut and pulled 2505 ft ds, cutting out rest. Dick Young et al's Singer 1, ne¼, se¼, sec 312, dr 820 ft.

BURLESON COUNTY — Walter Blumenthal's G. V. Crain 1, W. C. Pearce sur, ab 297, 1 mi fr Milam County line, top pecan gap 4418 ft, coring 4580 ft.

CALDWELL COUNTY—Pat Armstrong et al's No. 1, N. Dunlap Est. 431 ac farm in S. Seal sur, sd 21 ft. Detroit-Texas Dev. Co.'s W. P. Dunlap 3-A, S. F. Sanders sur, Dunlap area, sd 2390 ft. J. J. Elam et al's Francis-Brown-Cochran 1, W. F. Young sur, 5 mi e of Luling, sd 27 ft, for orders. Exploration Dev. Co.'s (Fred Meyer) W. R. Eibaud 1, 57-act tr, S. Seal sur, Dunlap area, dk. Joe Graham's Martindale 1, S. Morrison sur, e of Staples, sd 475 ft. W. C. Jenning's McMahan 1, James Pinchback sur, se of Lockhart, dr 400 ft. Marts & Beaven's J. J. Jolley 1, E. Pettus sur, midway between Lockhart and Lytton Springs, sd 1566 ft; G. Mackey 1, 201ac tr, G. Pace sur, dr 220 ft. Ogden & Reed Oil Co.'s R. B. Vickery 2, 100-ac tr, S. Damon sur, 2 mi se of Dale, coring 1920 ft. Fred G. Scott's E. P. Dunavent 1, 4 mi se San Marcos, sd 135 ft. Sterling & Wilson's M. L. Strawn 1, Pablo Martinez sur, at Lytton Springs Townsite, ru. M. R. Tinkle et al's Arnold 1, S. Seal sur, Dunlap area, lcn.

CALHOUN COUNTY — Continental Oil Co.'s Am. Nat'l Realty Co (Moody) 2-A (3), sec 6, blk C. P. Garcia sur, 9 mi se Seadrift, td 9083 ft, prep to set 5 3/17-inch csg on bottom, hole heaved up to 8020 ft, trying to wash to bottom; attempted but failed run SLM. Crown Central Pet. Co. et al's M. C. Driscoll 1, 990 ft each way out of n corner of lot 24, Armstrong Ranch sub, Benito Moralles sur A-28, mim. Humble & Plymouth's Patrick H. Welder 1, 4800 ft nwl, 5600 ft nel of 10,000-ac lse, Gardner Smith sur, wait on rig.

CAMERON COUNTY—W. T. Daniels & King-Woods Oil Co.'s Port Isabel Co. 1, center lot 17, shares 29, 30 and 31, Buena Vista gr, 6 mi north Bayview, sp and sd, wor.

DE WITT COUNTY — Hill Brothers & Koontze's Herman Riedel 1, 535, 5-ac tr, J. Santos sur (6 mi se of Yorktown) dr 3440 ft. Universal Oil and Glaspie's Schubel 1, C. Fitzgerald sur, ab 2 mi nw Yoakum, coring 715 ft, slight gas show.

DUVAL COUNTY—J. H. Chandler's Rita S. de Pena, Pena tr, sh 4, Mesquite gr, sand 2808-24 ft, sandy shale 2824-32 ft, oil odor, td 2832 ft, prep to set csg. Continental Oil Co.'s Clara Driscoll Sevier 8-A, 900 ft n and 650 ft e of nw cor sec 448, but in sec 50, Santa Rosalia gr, dr 2527 ft. Charles Daubert et al's D. F. Kreis 1, sec 518, 6 mi e Loma Novia, dr 1465 ft. Frank J. Gravis et al's Gravis et al 1, sec 250, 9 mi w San Diego, dr 3810 ft. Howard Pet. Corp.'s G. Ruiz 1, sec 5, e of Loma Novia, 4000 ft test, prep move in, contract let Humble O&R Co. No. 1, L. & P. T. Wright, se¼ of sec 118, 1 mi n of Seven Sisters field, ru. Marzo Oil Co.'s E. R. Hagist 2, sec 269, 480 ft e No. 1 Hagist, Hagist area, td 2119 ft, dst failed, set 7 inch csg 2105 ft, woc. W. C. McBride, Inc.'s E. R. Hagist 1, blk 13, sec 267, td 2125 ft, oil show 2117-20 ft, dst 2083-2120 ft, show of gas, 2 jts mud, 16 min. G. C. Porter's Milano Land and Stock Co. 1, sec 85, dr 2278 ft. Rogers & Rogers Cuellar 1, sec 117, Hoffman area, td 2872 ft, set 7 inch csg 2852 ft, Loma Novia sand 2854-71 ft, pulled liner, recement, perf 2868-71 ft, making some fresh water and oil. Santa Clara Oil Co.'s (Atkins & O'Neill) No. 1 Book Ranch (O. G. Glasscock) in Book Ranch in Santa Cruz de Concepcion gr in extreme southeast portion of county on 9829-ac tr, 6000-foot test, dr 3150 ft. Sun Oil and Simms Oil's Worden and Drought 3, sur 151, td 1709 ft, dry and abnd; sand 1682-89 ft, tested 630 ft sw, trace oil, 40 minutes. Westheimer & Daube's Z. Campos 3, sec 224, east outpost Seven Sisters field, sand 2221-33 ft, 7-inch csg 2224 ft, comp. swabbed 10 bph.

EDWARDS COUNTY — Paul Teas' J. B. Stewart 1, sec 2, GC&SF sur, 14 mi se Rock Springs, dr 1200 ft.

FRIO COUNTY — Amerada Pet. Corp.'s Cory & McWilliams 1, blk 13, Jose Arocha sur No. 298, 2¾ mi sw Smith 1, sd 5569 ft in Austin chalk, 7 inch csg set 5434 ft, not yet comp. Halff & Oppenheimer 5, S. Glenn sur No. 335, Pearsall area, dr 5120 ft. Halff & Oppenheimer 6, San Antonio Ditch Co. sur 1104, dr 4410 ft. Throton Davis et al's Halff & Oppenheimer 1, J. D. Clare sur No. 336, 1 mi w of Pearsall field, td 4033 ft, sand 4022-33 ft, set csg, fsh for swab.

GOLIAD COUNTY—Jane Oil Co.'s (Diamond Half Oil Co.) Gillett 1, J. Gomez sur, extreme western corner of county, 1 mi e North Pettus field, td 3707 ft, sand 3694-3704 ft, swabbed dry perf 8 shots 3697-3701 ft, no shows, ran slm—pb td equal 3701 ft, dr out cement to 3704 ft, underreamed fr 6⅝ hole to 11 ft fr bottom of csg to 3704 ft, testing; No. 2 Gillette, of 745 ac tr, J. Gomez sur, 660 ft e No. 1, lcn. H. J. Porter et al's J. R. Kaufman 1, 40-ac lse, A. Trevine sur, 1000 ft e of Kaufman 1-C, Hords Creek, lcn. Port Isabel & Co.'s Dauderstadt 1, in Solomon Hall sur in e end of county, 5500-foot test, dr water well. Thompson Drlg. Co.'s J. E. Pettus 1, in Maria de Jesus Y Bravo gr, 1100 ft se Stanolind No. 1, 12 mi nw Goliad, ru. Zeni Oil Co.'s (was S. T. Potter et al) Lutenbacher 1, blk 25, Goliad Townsite sur, south of Goliad, ru and sd.

GONZALES COUNTY—O. M. Owensby et al's H. B. Steen 1, N. M. Bane sur, dr 2105 ft. Tull et al's Boska 1, 61.2-ac tr, B. McClure sur, dr 1055 ft, shale.

GUADALUPE COUNTY—Paul Armstrong's Clem Broadnaux 1, 36-ac tr, W. P. King sur, 2 mi ne Kingsbury, sd 1510 ft, shale. Clark & Gay's Waldrip 1, center 1½-ac tr in Staples townsite, G. Allen sur, sp. Eickeroht & Gallagher's O. H. Jahns 1, 840-ac tr, Green Dewitt sur, 3 mi se South Darst Creek, Edwards lime test, sp. O. W. Killam's Reneker 1, in G. Chatwell sur, 3 mi sw Staples, td 1213 ft, dry and abnd. A. C. Locke's H. Holmes 1, 26-ac tr, Cyrus Campbell survey, 2 mi n and w of Staples, dr 530 ft; J. S. Slaughter, C. Campbell sur, sd 1050 ft. R. C. Robbins' Mrs. J. W.

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Manford 1, James Hodges sur No. 374, 1250 ft e Manford pool, sd 2581 ft, standardizing. Fred G. Scott's F. P. Pooley (Walter Schultz) 1, 2 mi s Staples, dr 195 ft. H. P. Suggs & L. R. Reedy's J. H. Sherrill 1, 100-ac lse, Geo. Allen sur (1½ mi s of Staples), dr 816 ft. W. J. Walton et al's Antone Zoboroski 3, ne corner of 227-ac tr in Joseph D. Clements sur, dr 930 ft, cored Navarro sand 866-923 ft, dst showed for dry gasser.

HIDALGO COUNTY—Dean Brothers' Mrs. Lula B. George 1, tr 13, porc 41, Reynosa Juris, 7000 ft e of discovery, 700 ft n of Samfordyce production, bldg dk. Gerald O&G Co.'s Nelson Mortgage Co. 1, blk 38, Lot A, La Blanca Agricultural subd, about four miles south of city of Donna, sp and sd, wait on cement. Gulf States Oil Co.'s Delta Orchards 1, lot 2, blk 73, Las Mestinas gr, 1 mi s Mestinas field disc well, dr 4070 ft, shale. J. C. Engelman 3, lot 3, blk 70, Las Mestinas gr, 700 ft e of Mestinas field disc well, lcn. Kingwoods Oil Co.'s Osca Daskam 2, blk 30, porc 45, 10 mi ne Mission, dk. Maddox & Tatum's John H. Shary 1, tr 48-2, porc 53, Reynosa Juris (abt 7 mi n and 1 mi w of city of Mission), dr 3100 ft. Maxwell-Mundy-Morris' Southland Dev. Co. (Hidalgo County Water Control & Impr. Dist.) 1, lot 11, blk 20, Alamo Land & Sugar Co. subd, Alamo gr, 4 mi s Alamo, testing 735 ft. H. J. Porter et al's C. H. Swallow 1, 600 ft nl, and el of lot 5, Swallow sub, Minnesota-Texas Land & Irrigation Co. tr, s Alamo, spud and sd. Quintana Pet. Corp.'s John C. Engelman 1, e½ of lot 10, blk 94, Mestines gr, 4 mi se of Gulf States No. 1 Engelman, dr 2420 ft. Dayle L. Smith Oil Co.'s Fairbanks & Young 1, blk 44, porc 46, Reynosa Juris, 4 mi e Samfordyce field, sd 1800 ft. Union Sulphur Co.'s ARGL&I 7, tr No. 2309, blk 59, about 4000 ft e of Mercedes field, coring 7433 ft. No. 8 ARGL Co., tr 2120, blk No. 87, N. Capisallo district, dr 3620 ft.

JIM HOGG COUNTY—French Oil Corp.'s E. Rodriquez 1, sh m-1, Partition of Las Cuevites gr, fsh 2765 ft. S. L. Miller Oil Co.'s Yeager 1, blk 6, sur 20, old td 2559 ft, test sw in sdtr hole 3535 ft, now dr 4030 ft. P. H. Neilson, Trustee de la Garza 1, blk 293, Pippin sub, Randado gr, sd 610 ft. G. C. Rankin's Vela 1, blk 6, sec 5, td 1911 ft, hole cleared, prep dd.

JIM WELLS COUNTY—Houston Oil Co. et al's E. A. Hawkins et al 2, blk 11, Putnam sub, sh 3, San Diego gr, ½ mi n disc well, San Diego field, coring 4580 ft. O. W. Killam's George Reynolds 1, s¼ of survey 28, J. Harper, grantee, 4 mi w of Orange Grove, ru. Henry Mode's B. W. Owens 1, 120-ac tr, J. Poitevent sur 151, ab 366, 2 mi s of Alfred, dk. G. M. Richardson's No. 1 J. E. Garrett, sec 5, N. G. Collins grant, 15 mi n Alice near Highway 66, ru. J. E. Walsh's W. D. Wade 1, lot 3, blk 6, W. H. Bode sub, Sandis district, sd 2920 ft, may deepen to 4000 ft.

KERR COUNTY—Auld & Evan's Heffner 1, sec 13, BS&F sur, dr 1435 ft. Eastland Oil Co.'s Jeff Love 7, in J. Martinez sur, sec 1594, 640-ac tr, 6000 foot test, td 1305 ft, running 10 inch csg. Edmiston's Will Auld 1, 418-ac tr, sec 1592, 2500 ft sw Eastland 1 Love, sp and sd.

KLEBERG COUNTY—John Bartlett's Anton Dietz 1, blk 16, sec 48, K1&T sur, 2 mi sw of Kingsville field, dry and abnd 3010 ft. Clark & Anderson's J. W. Kellam 1, lot 7, sec 53 KT&I sub, 2 mi se Kingsville field, ru and sd.

LAVACA COUNTY—J. D. Aiguier et al's No. 1 A. A. Staffa, W. R. Henesy sur, 3 mi s of nl of county, dr 1580 ft.

LEE COUNTY—Mills et al's Batey 1, W. Nichols sur, 14 mi nw of Lexington, dry and abnd 3365 ft.

LIVE OAK COUNTY—Dirks Brothers' J. R. Dougherty 1, J. Beagle, 6 mi w of La Garto, dk, wait on rig. R. H. Feltner et al's John T. Carter & Bros. 1, nw 120-ac tr of w 160-ac pf sec 319, T&T Ry. Co. survey in extreme sw portion of county, near Sanger Ranch test, dr 1600 ft. Houston Oil Co.'s Mrs. C. L. Cartwright 33, 1172 ft n No. 21, 880-ac tr, Francis Botello survey, dr 3150 ft, dst 2095-2115 ft, show 370 lbs. dry gas 10 min. Ogden & Reed's D. C. Reed 1, Clegg Ranch, sw part of county, dr water well. Santa Clara Oil Co.'s (Atkins & O'Neil) R. H. Corbett 1, Corbett sur, fsh 3522 ft. L. W. Stieren's Smith 1, 181-ac tr, T. B. Reese sur, 6 mi e Oakville, dr 1450 ft.

MAVERICK COUNTY—I. N. Boicourt's Bandera County School Land, sur No. 231, 1 mi sw of Darling, dr 220 ft. Fulwood & Marr's State Bank & Trust Co. 1, GC&SF sur No. 3, 2 mi n of Eagle Pass, sd 770 ft. Thompson & Streeter's Joseph Wipff 1, sec 18, 7 mi w Chittim field, 10 mi n Eagle Pass, sd 220 ft.

McMULLEN COUNTY—Darby Petroleum's Hagist 3-B, 990 ft wl, 330 ft sl, AB&M sur No. 181, lcn. Thorton Davis et al's (Whisenant and Trenchard) Roos Bros. 1, sur 93, 3 mi e and n of Loma Alta field, dr 460 ft. F. Daybault's Matula 1, 100-ac, James Garner sur, 2½ mi sw Calliham, dr 1018 ft. Charles A. Hall No. 2 Claunch, 200-ac tr, M. Hely sur, ½ mile s Calliham, 400 ft se No. 1, dr 450 ft. Luray Oil Co.'s Glass 8, Gardner sur, Calliham area, td 1070 ft, pb 720 ft, sand 699-720 ft, set 6⅝ casing, comp, 20 bpd on pump. Magnolia Petroleum Co.'s Kincaid 1, section 86, 3 mi e of Texio well, sp. W. E. Rowe's Lee 1, 330 ft w and n fr sw cor of ne¼ of se¼ of sec 34, La Chusa Land Co. sur, lcn. Stewart et al's Guy Lowe 1, Geo. Bright sur No. 21, 2½ mi sw Tilden, sd 2250 ft. Stella Tiechman's J. J. Henry 1, 575-ac tr, A. Torres sur No. 21, ab 457, 7 mi w Tilden, sd 370 ft. Ike W. Taylor's H. L. Lark 1, blk 56, Lark subd, E. W. H. Scrugham sur, between Calliham and Jacob field, td 980 ft, swabbing, flowed by heads, 13 bph for 6 hrs. Witherspoon Oil Co.'s Calliham Estate 1, blk 11, M. Hely sur, ru.

MEDINA COUNTY—Frank A. Brown's A. E. Brueks 1, John Ward sur, sd 700 ft; Mary Winn 1, John Ward sur, td 60 ft, set sur cas and sd. W. C. Campbell et al (Ed Falvey et al's) McMenemey 1, sur No. 331, G. Petty sur, 4 mi se Devine, td 2892 ft, pb to 2230 ft, set csg at 1910 ft, drilling plugs, sand shown on electric formation test 1918-2230 ft. Caraco Oil Co.'s Taylor 3, Brushet sur 135, td 356 ft, prep rework. Gates & Hill's W. B. Odom 5, 160 ft wl, 300-ac tr, H. Castro sur No. 174, 5 mi sw Hondo, dr 160 ft.

MILAM COUNTY—R. G. Cannon's H. & L. Ludson 1, 100-ac tr, S. C. Robinson sur, sp and sd.

NUECES COUNTY—D. H. Hawn's Wm. Shely 1, center of 9-ac tr about 2500 ft ne Saxet Heights field, 2220 ft due s of Chemical plant, Villareal survey, dr 3700 ft. D. H. Hawn's Dr. C. W. Skipper 1, 330 ft fr sl, 475 ft fr el of 16-ac tr, E. Villareal survey, lcn. Refugio Refining Co. (Garland Clymore) Jones Weil 1, 80-ac tr. Villareal sur, 1 mi se Saxet Heights, sd 4500 ft. Santa Clara Oil Co.'s (Atkins & O'Neil) C. H. Cooke 1, sec 14, Guadrilla Irrigation Co. sur, 4 mi e Driscoll, ru. Taylor Refining Co.'s John Dunn 1, 340 ft sl, 330 ft el of 53-ac tr Villareal survey, spudding. Thompson & McGrew's A. F. Geistman 1, 120-ac tr, in J. R. Ward sur 316, offset to Nelson No. 1 Buckholt, lcn.

REFUGIO COUNTY—Quintana Pet. Corp.'s Fannie Heard 1, 475 ft sl, 2296 ft wl of Thomas Webb sur, ab 298, 3 mi e of Greta field, 1 mi n Tomoconnor, lcn. Texas Gulf Prod. Co.'s Carl Arnold 1, sec 33, Bonnie View subd, Wood Ranch, 9 mi se Woodsboro, dry and abnd 6554 ft. United Prod. Co.'s M. F. Lambert 22, blk 22, C. A. Hardwick sur, elev 65 ft, dd, td 6538 ft, cored sw sand 6502-38 ft, pb 5450 ft, woc.

SAN PATRICIO COUNTY—Argo Royalty Co. & Willis Storm's Nancy Hobbs 1-A, 215 ft nw No. 1 Delgado gr, 1 mi s Mathis, wait on rig. Humble Oil and Refining Co.'s J. W. Godwin 1, lot 1, sec 23, third addition, Taft Farm Lands, dr 6057 ft; No. 2 Godwin, 210-ac

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tr, Taft Farm Land, sec 23, lcn; J. W. Mayo 1, J. N. W. Ottman sur, dk. Nobod Royalties Inc.'s (Texon Drlg. Co.) R. L. Rambo 1, lot 6, sec 35, 4th addition Taft Farm Lands, ½ mi e of s end of Plymouth field, ru. Hiriam Reed et al's (Herman Heep) R. Svedlenak 1, lot 1, sec 5, first addition, Taft Farm Lands, 1½ mi s Taft discovery, dr 4790 ft. Shell Pet. Corp.'s G. W. Pullin 1, 330 ft nl and el sec 1, second addition Taft Farm Lands, w offset Taft field discovery well, lcn. Geo. E. Smith et al's J. L. Britton 2, 660 ft due e No. 1, blk 8, sec 5, Third addition Taft Farm Lands, sd 4932 ft for orders. Stanolind O&G Co.'s Floerke 1, lot 5, blk 17, first addition, Taft Farm Lands, 4 mi s and e of Taft field, dr 4798 ft. Sun Oil Co.'s M. K. Edgar 2, sec 34, Fourth Addition, Taft Farm Lands, Plymouth area, dr 6781 ft.

STARR COUNTY—Ash & Tackett's R. E. Margo 1, blk 4, sh 3-B, porc 70, Juris of Mier, sd, 378 ft. O. G. Borah et al's V. C. de Guerra 1-A, sh 92, porc 68, 2 mi n of Roma, sd 260 ft. John H. Clopton's Kelsey Bass 1, center sec 357, 8 mi s of Cuevitas, dr 2235 ft. No. 2 A. K. Bass, sec 377, 1½ mi s No. 1 Bass, sp. Coreta Pet. Co.'s J. H. Burnett (Heden et al) 1, sh 47, porc 80, sd 1500 ft. Griffin & Kimbrough's Guerra 1, sh 298, porc 69, n of Mier, lcn. Harter & Maynow's Sanchez 3, sh 69, porc 72, n Rome, sd 512 ft. Marc Jenkins' Wm. Martin 1, sec 627, 13½ mi ne of Rio Grande City, sd 775 ft. A. F. Vannoy et al's (Marc Jenkins et al) H. Garza Jr. 1, blk 10, sh 26, porc 70, nw of Rome, td 910 ft, sd contract depth. A. J. Wayel's Wardner 1, 160-ac tr, porc 84, td 2040 ft, still making gas, salt water, to dd. Otto W. Woods H. P. Guerra 1, lct 35, Conroe subd, porc 55, Mier Juris, spd in.

VICTORIA COUNTY — Barnsdall & Felmont's W. R. Smith 2, A. Murray sur, ab 259, Placedo field, coring 5350 ft. Costa & Eastern Texas' Kruppa 1, Rupley sur, ab 290, dr 6275 ft. Gillespie & Superior's Henderson & Pickering 1-B, blk 93, SA&MG Ry. sur, ab 308, 1 mi w of Placedo production, comp 4773-80 ft, flowing 15 bph ¼ choke, tp 400 pounds. S. A. Guiberson & Chas. Pettit's Oscar Wedemier 1, 406.82-ac tr, Jose Carabajal sur, 4 mi nw of Victoria, sd 5297 ft for orders. Rowan & Hope's A. W. Scheel 1, Scheel 195-ac tr in J. N. Esalera gr, lcn. E. L. Smith & Gulf Prod. Co.'s S. E. Wright 2, J. M. Brownson sur No. 8, Placedo area, coring 5918 t. S. C. Yingling's Jacob Stehle 1, 15-ac tr, P. Gallardo sur, ab 32, 1 mi sw of Coleto Creek field, dr 3580 ft.

WEBB COUNTY—Foster Barneley's C. H. Webster 5, ne¼ of sw¼ of sur 684, sd 2965 ft. Mills Bennett's M. de Perez 1, s 1/3 of w½ of sur 709, drlg 3325 ft (last rept). Cole Pet. Co.'s Ross Benavides 93, blk 10, sec 7, Cole sub, Cuellar grant, Cole district, td 3411 ft, pb and set 7 inch csg 2400 ft, will perf above. I. Howard et al's A. Lopez 1, sec 2350, se Lopez field, dr 2317 ft, show sw with little oil 2276-88 ft. O. W. Killam's A. M. Bruni 45, sec 453, dr 2840 ft; A. M. Bruni 46, sur 455, dk. A. M. Bruni 6, tr B-7, El Ranchito 6723.5-ac tr, J. V. Borrego gr, spud in. Payne & Martinez's Mrs. M. P. Perry 1, sur 771, lcn. Holland S. Reavis's C. H. Webster 1, nw ne sec 684, 1 mi e Carolina-Texas field, coring 5455 ft. S. S. & B. Oil Co.'s Lone Star Construction Co. 9 (now Lutex Oil Co.), porc 12, ½ mi nw Laredo, sd 2004 ft. South Texas Oil Co.'s Fee 1, blk 21, sec 768, 1½ mi sw Laurel field, sand 1729-42 ft, dr out plugs. Superior Oil Co.'s A. S. Billings 1, sec 7, 1 mi w Lopez field, td 3420 ft, perforating 2200 ft sand. W. H. Vernor, tr's Jefferies Ranch 1, blk 13, sec 1453, 30 min nw Laredo, dr 995 ft. A. H. Wray's Geo. Steumpke 1, sh 1, Bresster Pasture, Joaquin Galan gr, dry and abnd 1678 ft.

WILSON COUNTY—Comet Oil Co.'s Jim McDaniel 1, 343-ac tr in Conception Botello sur, 4 mi Poth, sp and sd. A. G. Reimenschneider's Lon Harrell 1, 209-ac tr in Manuel Baerrera sur, 5 mi s of Floresville, dr 783 ft.

ZAPATA COUNTY — Murt Cullinan's E. Gutierrez 1, blk 4, sh 2, Fansler Partition, Comitas gr, 2 mi Escobas fie'd, sd 2014 ft. J. J. O'Hern et al's S. Neal 1, blk 3, porc 25, 7 mi ne of Charco Redondo field, dr 2310 ft.

ZAVALLA COUNTY—W. L. Bridges' E. B. Flowers 1, sec 19, blk 1, I&GN RR sur, sd 304 ft. Frank Buttram et al's Whitecotton 1, B&M sur No. 1, dk. Leona Oil Corp.'s Geo. West 1, C. Bustillo sur No. 1, dk, mir.

TEXAS GULF COAST

BRAZORIA COUNTY—Gulf's Fairfie'd 1, Sandy Point prospect, A. Robeson sur, dr shale 4690 ft. Strake Petroleum Corp.'s Poole 1, Poole Ranch, W. Eggers sur, ru.

BURLESON COUNTY — Walter Blumenthal's Crain 1, se of Rockdale, W. C. Pierce sur, fsh 5037 ft.

CHAMBERS COUNTY — Black Gold Pet. Co.'s Barrow 1, Jackson Lake prospect, R. Barrow sur, dr shale 7465 ft.

COLORADO COUNTY — Coyle-Concord's Powell B-2, Garwood area, I&GN sur, sdtr 5800 ft.

GALVESTON COUNTY—Sun's Hughes 1, Green Lake prospect, W. C. M. Baker sur, dr shale 8421 ft.

HARDIN COUNTY—Republic Prod. Co.'s Burrell Fee 1, n of Silsby, A. A. Burrell sur, dr shale 7782 ft.

HARRIS COUNTY—Cockburn Oil Corp.'s Thompkins 1, Burnett Bay prospect, N. Lynch sur, dr shale 5860 ft. Glenn H. McCarthy's Houston Ship Channel 1, Cockburn prospect, R. R. Vince sur, dr shale 3818 ft. H. C. Hill's Swilley A-1, Sheldon prospect, V. Blanco sur, dr shale 6020 ft; same operator's Swilley B-1, V. Blanco sur, sd 7550 ft. Texas Gulf Prod. Co.'s Westmoreland 1, Bellaire prospect, J. B. Pier sur, abd 9111 ft.

JEFFERSON COUNTY—Glenn H. McCarthy's B. M. Longe 1, Amelia prospect, H. Williams sur, dr shale 4400 ft. Sun's Broussard 1, Labelle area, B. Blackmon sur, woc 8340 ft.

MATAGORDA COUNTY—Hammon Exploration Co.'s M. Cleveland 1, se of Bay City, E. Hall sur, preparing to run cas to 9442 ft to perforate. Helmerick & Payne's Hawkins 1, Sheppards Mott, D. A. McCarthy sur, cutting and pulling 7816 ft. Sun's Craig 1, e flank Hawkinsville dome, T. Williams sur, running a protection string of csg to 5236 ft.

MONTGOMERY COUNTY — Chapman & Smith's Delta Land Co. 2, Dacus prospect, T. Sheppard sur, dr shale 436 ft. Wm. Thompson et al's J. B. Scott 1, F. Wheeler sur, coring sand 2417 ft. West Production Co.'s Foster Lbr. Co. 4, se of Conroe, T&NO sur, sd 5756 ft.

ORANGE COUNTY—Blue Line Oil Co.'s Peet 1, n of Orange, R. Ballew sur, dr shale 2695 ft.

POLK COUNTY—J. T. Lightfoot's L. Davidson 1, ne of Corrigan, Houston County School Land sur, sd 1020 ft. Gist & Graddy's Knox 1, F. Chair sur, no report.

SAN JACINTO COUNTY—Cockburn Oil Corp.'s Moore 1, n of Rayburn, J. F. D. Rumayor sur, fsh 4718 ft.

WHARTON COUNTY—Pure's E. Paige 1, Blue Basin prospect, J. Pirie sur, ru to deepen from 7676 ft.

WYOMING

CARBON COUNTY—General Petroleum Corporation Whitford 1, se se se 24-20n-84w, pg to 5922 ft. Shirley Wyoming Oil Co. Quealy 1, nw ne 21-26n-80w, abn 1250 ft.

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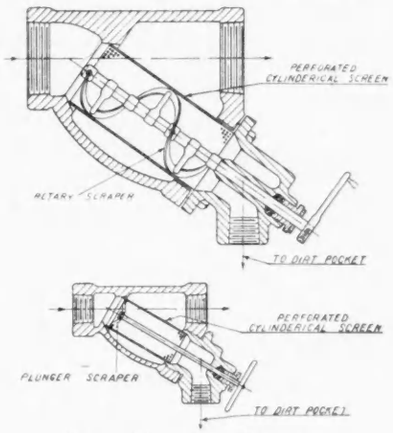
PIPE LINE STRAINER

Sarco Company

Sarco Company, New York City, is offering a modification of its pipe line strainer that is fitted with a plunger or



Sarco Pipe Line Strainer

rotary scraper within the cylindrical screen, enabling the screen to be cleaned without removal. The new type strainer is particularly suited for use on oil lines where the flow is continuous.

FRICTION BREAKOUT CATHEAD

Hill and Foster Company

Hill and Foster Company, Wichita Falls, Texas, recently put on the market a new cathead called "Foster Friction Breakout", a smooth friction clutch cathead designed to supplement the company's Type MJ of junior size and Type M for heavy duty breaking out.

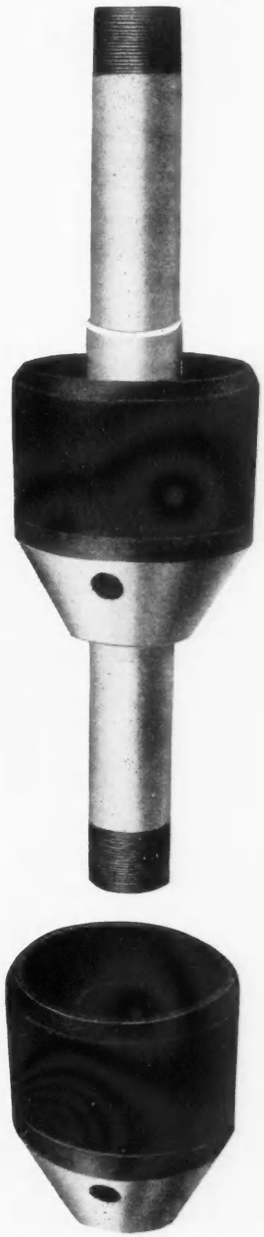
Hill & Foster Cathead

The friction breakout provides, according to the manufacturer, ample power to break the joint, ample clearance between the clutch faces when disengaged, full automatic release for the clutch when the joint is broken, and provision for keeping the clutch faces clear from lubricants and mud. It is especially recommended for use with electric, Diesel and gasoline rigs, where the speed of the line shaft is rapid.

TESTING DEVICE

The Texas Rubber & Specialty Corp.

The Texas Rubber & Specialty Corporation, Houston, has introduced a unique new tool for testing to determine whether any of the joints or fittings above the top of surface casing are leaking. It is called



Texas Rubber Testing Device

the Okeh Blowout Preventer Tester, and may be used to test the strength of the derrick crown block, or even wire lines by placing a definite load against the tester and checking this load with the weight recorder.

It is primarily a safety tool to assure the operator during the drilling operation that his surface equipment is not leaking and that blowout preventer sealing qualities are intact. A test requires about 15 minutes, at the most, the manufacturer states.

The assembly includes a heat treated, triple strength steel sub with a rubber sealing head mounted thereon. The tool confines the fluid used for testing to a given space, sealing outwardly against casing and inwardly against drill pipe sub. To make the test the driller picks up drill pipe off bottom equal to a thribble and sets his slips. Drill pipe is then broken out and the tester made up between joints, making up single, or double if required, above the tester, which is then lowered so that the rubber head will stop at any point desired below the master gate valve. Drill pipe is then hung on elevators and weight recorded on the indicator. Rams of preventer are then closed. Discharge of the pump, or pumps, is connected to the fill-up line and slush or water is pumped at the pressure desired for the test. The tester rubber seals at bottom and preventer rams seal at top, while weight indicator records the pressure being exerted. Any equipment showing leaks can then be repaired or replaced.

The drill pipe sub used is standard size, having standard 4-inch drill pipe thread. By the use of tool joint subs, the tester can be adapted to any size or drill pipe.

BOILERS

Lucey Boiler and Manufacturing Corporation

Lucey Boiler and Manufacturing Corporation, Chattanooga, Tennessee, recently placed on the market its new "84-Inch" rivetless fire box, oil country boiler, a type that the manufacturer claims embodies a number of outstanding improvements, as well as some radical changes in design. Briefly, those changes consisted in butt welding the fire box heads to the fire box wrapper. By this construction the section of metal between the fire and the water is of uniform thickness throughout, and the heat transfer is not retarded by lapped plates and rivet heads.

East Texas Directory

East Texas Oil Field Directory, priced $1.50, has been published by G. E. Wimberly, Box 442, Kilgore, Texas. The directory lists all operators, pipe lines and refineries in the East Texas field. Their addresses are given and on the operators the superintendent's name is given. Also shown are various affiliated industries, such as abstractors, bit shops, chemical companies, supply houses, etc. A map of the field is also presented on a small scale.

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The LAYNE & BOWLER Co.
HOUSTON · TEXAS

This Week with the Industry's EQUIPMENT SUPPLIERS

S. M. Jones Opens Houston District Office

Effective February 1, The S. M. Jones Company opened a Houston division office in room 1005 Sterling Building, with L. J. Pundt as division manager in charge and C. E. Buckner, Jr., as sales engineer. The Houston office is equipped to handle field engineering department requests and to give producers complete information on sucker rods and pumping conditions affecting sucker rod life.

Johnston & Jennings Tulsa Representative

The Johnston & Jennings Company, Cleveland, Ohio, manufacturers of the "Oceco" line of tank fittings, flame arrestors, vents, meters and pumps, has announced the transfer of W. H. McDunagle from Tulsa to the home office. He had represented the company in the Mid-Continent fields for more than eight years.

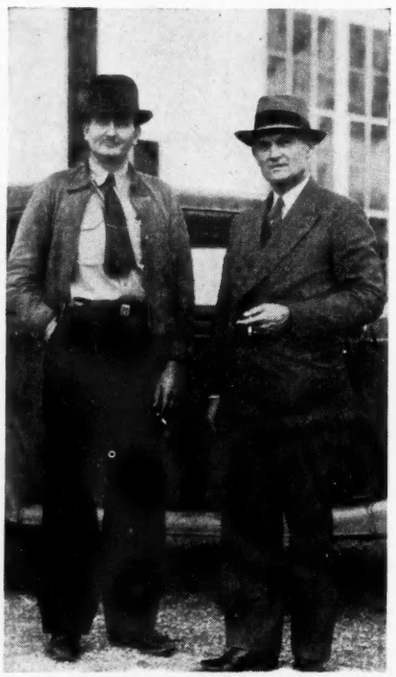
Mid-Continent representation and engineering and sales service will be continued by the MacGreager Engineering Company, Tulsa.

Harry B. Clapp Joins Clark Tructractor Company

Clark Tructractor Company, Battle Creek, Michigan, manufacturers of gas-powered industrial trucks, tructiers and tractors for material-handling operations, has announced that Harry B. Clapp has joined its staff as transportation engineer.

Clapp is a native of Michigan, an engineering graduate of the Colorado School of Mines, and his business career embraces production, cost analysis, and the elimination of non-productive labor in manufacturing plants. He will make his headquarters at Battle Creek as special engineering assistant to Ezra W. Clark, vice president.

His services will be at the disposal of manufacturing, railroad, and terminal interests seeking methods and means of lowering material- and freight-handling costs.



C. A. Muncey, (left), formerly with the Oilwell Supply Company for 13 years, and for the past year manufacturer's representative in the South Louisiana territory, has been appointed representative for the Cameron Iron Works, Inc., in South Louisiana. Muncey will make his new headquarters in Lake Charles, Louisiana. With Mr. Muncey in the picture is L. D. Hilton, Sales Manager of Cameron Iron Works, Inc., Houston.

Covic Diesel Engine Gets Small Unit Rights

Covic Diesel Engine Company, Los Angeles, has announced that it has acquired the sole American manufacturing and distribution rights under various American patents for well-known English "Victor Horizontally Opposed Diesel Engine," which line of engines it will manufacture and market in the United States under the name of "Covic Diesel Engines."

The manufacturer states that large numbers of these small Diesel engines are in successful use in over 20 types of applications. They are recommended for use with road machinery, welders, drag lines, miscellaneous vehicle adaptations, concrete mixers, standby units, auxiliary units for larger Diesel installations, pumping oil and water, and general oil field use.

George Dandrow Promoted By Johns-Manville

George Dandrow has been made manager of the New York District of Johns-Manville Corporation's power products and industrial department, with offices at 22 East 40th Street, New York City. The appointment became effective on January 15.

Dandrow joined the Johns-Manville organization in 1922 directly following his graduation from the Massachusetts Institute of Technology. After five years in Johns-Manville's Boston branch, Dandrow joined the general engineering staff at headquarters in New York and for the last few years has been assistant manager of the New York district.

New Officers for Clark Brothers Company

Clark Brothers Company of Olean, New York, has announced new officers, elected following the recent death of J. S. Reid, president of the company.

The new officers are C. Paul Clark, president; John B. O'Connor, vice president; and F. H. Light, secretary and treasurer.

Paul Clark is a son of one of the founders of the company, William

PAUL CLARK

J. B. O'CONNOR

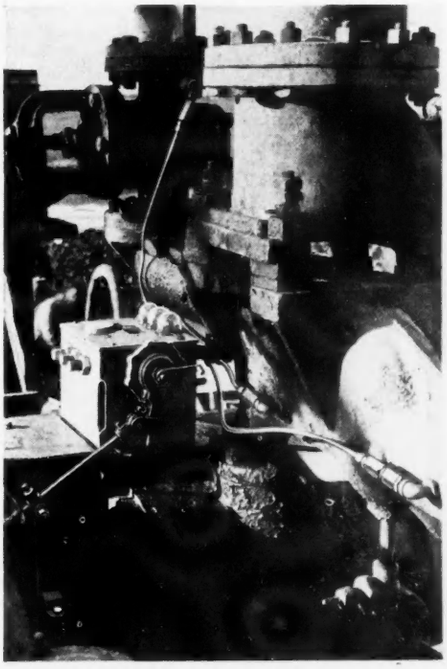
F. H. LIGHT

Clark, and has been responsible for the development of the company's oil field engine and compressor equipment. Clark Brothers Company was originally one of the largest builders and exporters of saw mill equipment and stationary steam engines in the country. The company is still a large maker of saw mill equipment, though its largest volume now consists of oil industry engines and compressors.

"Johnny" O'Connor has been with the company since 1929, having started as manager of the Texas office. He was advanced to the position of sales manager in 1932, with headquarters at Olean, and as vice president continues to be director of sales.

Light has been with the company for many years. He advances to his present position from that of assistant secretary and treasurer.

The company has also recently announced the appointment of D. K. Hutchcraft, for many years on its Mid-Continent sales staff as Mid-Continent manager with headquarters at the Tulsa offices.



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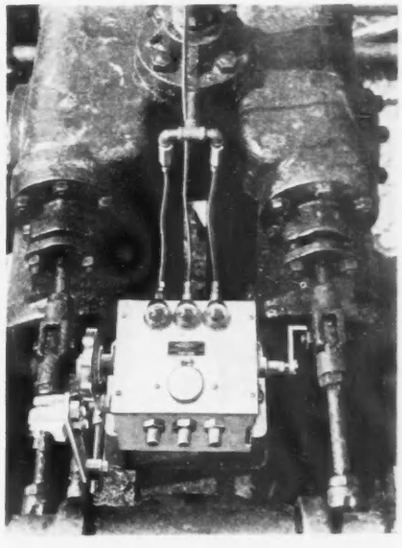
LEFT: A "STANDARD" 3-feed Lubricator means lubrication insurance to this engine. RIGHT: This 3-feed "STANDARD" has taken the lubrication worries off the mind of the operator of this pump.



See pages 92-93 your 1936 Composite Catalog, or write us for full details and prices.

American Lubricator Company

First National Bank Bldg., Dallas, Texas

***Export:* Oil Well Supply Company**

Squeaks from the Bull Wheel

Center Attention

Minister—I do wish I could think of some way to make the members of the congregation pay attention to me when I'm preaching.

Son—Why don't you put the clock right behind the pulpit?

Not That Bad

"Well, Mrs. Joyner," said the minister, "so your husband has joined the Great Majority?"

"Oh, don't say that, sir," said Mrs. Joyner. "I'm sure he was not as bad as all that."

Crazy

The eminent alienist recognized the thug who was holding him up.

"Look here," he protested; "I'm your benefactor. Don't you recall that I once saved you from a life sentence by proving you crazy?"

"Sure, I remember you now," the thug said as he continued his work. "And ain't holdin' up your benefactor a crazy thing to do?"

Courtesy

A certain middle-aged spinster has a vivid memory of Texas courtesy.

She was struggling with a hot cup of coffee in a small-town railway station, trying to gulp it before the train pulled out. A cowboy, seated a couple of stools away, noted her plight, and seeing the guard waving to the woman, came to the fore.

"Here, ma'am, you can take my cup o' coffee. It's already saucered and blowed."

Mimories

Pat—That was a foine sintiment Casey got off at the banquet last night.

Mike—What was it?

Pat—He said that the swatest mimories in loife are the ricollections of things forgotten.

Sauce

A husband found some holes in his socks and said, "Wifie, dear, why haven't you mended these?"

"Hubby, darling, did you buy me that fur coat you promised?"

"N-no."

"Well, if you don't give a wrap, I don't give a darn."

Trying Indeed

Anxious Mother: "Would you say that my little Oscar is really trying?"

Teacher: "Yes—very."

Fair Enough

Employer (to tardy office boy): "What's your excuse for being late this time?"

The Boy: "Stop me if you've heard this one."

Lots of Fun

I've had a hard day. One of my office boys asked the afternoon off to attend his aunt's funeral. So, being on to his scheme, as I thought, I said I'd go along too.

Good idea! Was it a good game?

That's where I lost out. It was his aunt's funeral.

Helpmeet

Phil: "I understand that a wife is a great help to a man."

Bill: "Yes, she'll stand by you in all the troubles that you wouldn't have had if you hadn't married her."

Repartee

First Woman: Well, I must be off. I've an appointment with my mother.

Second Woman (giving an astonished laugh): My dear, is it possible that you have a mother living?

First Woman (laughing in her turn): Yes, oh, yes. And do you know, I don't believe she looks a day older than you.

Very Rare

Visitor: I hear you are a collector of antiques.

Newrich: Yes, I have a very rare typewriter which was owned by Napoleon.

But that is impossible. Typewriters had not been invented in Napoleon's time.

I know it. That is what makes it so rare.

All Set

How is your farm work coming?

Fine. The billboard and hot dog stand painting is all done and the summer gasoline is all in the filling station and paid for.

Oh, Papa!

I hope you don't think I'm the doll type.

No, I don't think you'd say "Mama" if I squeezed you.

Deserving

Abie: It says here in the paper that Goldstein had a fire in his store last night.

Izzy: Vell, he's a good business man, unt a nice feller, too. He deserves it.

Convincing

Film Star (using new toilet preparation): This is awful stuff. Why did you ever buy it?

Her Maid: I read an advertisement in which you praised it very highly.

Tip Top

Well, waiter, that was a tip top dinner. You know what that means, don't you?

Yes, sah. It's one that you top off with a tip.

The Sign Language

A teacher with a record of long years of service in the grade schools was driving her car when the traffic cop raised his arm in a vain attempt to halt her progress. By means of repeated blasts on his whistle he finally halted her a half block from the scene of her misdemeanor.

"Don't you know," he inquired politely but severely, "what it means when I raise my hand?"

"I ought to," she answered, "I've taught school long enough."

Hesitated

Cockney woman (charged with assaulting her husband)—"I asked 'im if 'e loved me, and 'e was so long thinkin' about it that I 'it 'im with a mop."

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GOTT Water Coolers are the convenient way to keep drinking water handy to the worker, protect it from impurities. Their exclusive construction keeps water cool for long periods. Snug fitting large removable top, handy non-leaking push button faucet. GOTT Water Cans for handy field use. Your Supply Store has them, get one today! . . . .
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WHY BURY

IDLE DOLLARS

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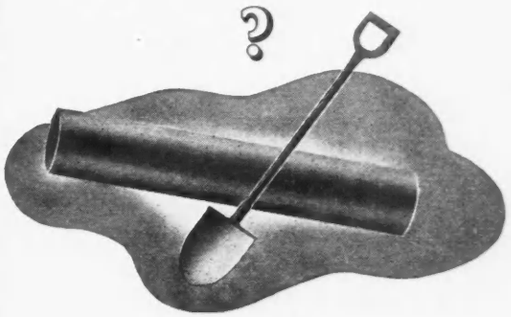

That's what you do when you buy gas-gathering pipe with a lot of excess weight—*bury idle dollars in the ground where they can't work.*

But look at ARMCO Spiral Welded Pipe for a moment. Here is a trim, easy-handling pipe in a wide range of diameters and wall thicknesses, and its longer lengths mean fewer joints.

This means that with ARMCO Spiral Welded Pipe, you can design with the one right wall thickness for a specific job. And you get pipe that's strong and ductile, easy to install, and pipe that gives you the finest welding quality. You buy no *unnecessary metal* — every ounce does its work. And it's smooth inside, too.

Send your pipe specifications to Armco—for diameters 6-inch to 36-inch; for wall thicknesses 7/64 to 1/2 inch; and lengths to 40 feet. Ends are provided for mechanical couplings or field welding, and the pipe is mill primed as required. A letter or telegram will do the trick. The American Rolling Mill Company, Pipe Sales Division, 703 Curtis Street, Middletown, Ohio; Tulsa, Okla., Office, 538 Mayo Bldg.

ARMCO

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SPIRAL WELDED PIPE

INDEX TO ADVERTISERS

A

Page

J. S. Abercrombie C. —
Abercrombie Pump Co. 86
Allsteel Products Manufacturing Co. —
Alten's Foundry & Machine Co. —
American Askania Corporation —
American Association of Petroleum Geologists —
American Cable Co. —
American Hammered Piston Ring Co. —
American Hoist & Derrick Co. —
American Iron & Machine Works —
American Lubricator Co. 103
American Meter Co. 60
American Roller Bearing Co. 51
American Rolling Mill Co. 105
American Sand-Banum Co. 98
American Seismograph Co. 99
American Steel & Wire Co. —
Armstrong Brothers Tool Co. —
Ash Grove Lime & Portland Cement Co. —
Athey Truss Wheel Co. —
Atlas Powder Co. —
Axelson Manufacturing Co. —

B

Baash-Ross Tool Co. —
Baker Oil Tools, Inc. 3 and 45
Baldwin-Duckworth Chain Corp. Third Cover
Baldwin-Southwark Corp. —
Baroid Sales Co. 43
The Barrett Co. —
William M. Barret, Inc. 99
Beaumont Iron Works —
Black-Sivalls & Bryson —
Bowling Green Refining Co. —
Bradford Motor Works 105
Brance-Krachy Co. —
Brauer Machine & Supply Co. —
The Brewster Co. —
Bridgeport Machine Co. 37
Broderick & Bascom Rope Co. —
Brown Tool Co. —
A. M. Byers Co. —
Byron Jackson Co. —

C

Cameron Iron Works —
Carson Machine & Supply Co. —
J. I. Case Co. 17
The Cavins Co. —
Chain Belt Co. —
Chicksan Oil Tool Co. 66
Chemical Process Co. —
Clark Brothers Co. 67
Robert P. Clark Co. 99
Columbian Steel Tank Co. —
Continental National Bank —
Continental Oil Co. 33
The Continental Supply Co. 53
Fred E. Cooper Co. —
Cooper-Bessemer Corp. —
W. H. Curtin Co. —

D

Darling Valve & Manufacturing Co. —
The Dayton Rubber Manufacturing Co. —
Dean Core Barrel Manufacturing Sales and Service —
De La Vergne Engine Co. —
Demag, A. G. —
Diamond Metal Co. —
David Donoghue 99
Dowell Incorporated —

E

Eastman Oil Well Survey Co. of Texas —
Economy Electric Lantern Co. —
Elliott Core Drilling Co. —
Emsco Derrick & Equipment Co. —
Exner-Dodge Packing Co. —

F

Geo. E. Failing Supply Co. —
First National Bank of Fort Worth —
First National Bank, Houston 75
First National Bank and Trust Company of Tulsa —
Foote Bros. Gear & Machine Works —
Fort Worth Laboratories 99
Fort Worth National Bank —
Frick-Reid Supply Corp. —

G

Page

Gardner-Denver Co. —
The Garlock Packing Co. 91
Gaso Pump & Burner Mfg. Co. —
General Electric Co. Second Cover
L. H. Gilmer Co. 30
Globe Oil Tools Co. —
Goodall Rubber Co. of Texas —
B. F. Goodrich Rubber Co. —
Goodyear Tire & Rubber Co. —
H. P. Gott Manufacturing Co. 104
Grant Oil Tool Co. —
Gray-Kerotest —
Gray Tool Co. —
Greene, Tweed & Co. —
The Guiberson Corp. —
Gulf Envelope Co. —
Gulf Publishing Co. 26-27
Gulf States Utilities —
Gustin-Bacon Manufacturing Co. —

H

Hall & Lowrey, Inc. 80
Halliburton Oil Well Cementing Co. —
Hardway & Cathey 99
Harrisburg Steel Corp. 85
Haynes Stellite Co. 55
Hazard Wire Rope Co. —
C. M. Heeter Sons Co. —
Hercules Motors Corp. —
Hercules Tool Co. —
Hewitt Rubber Corp. —
Hill & Foster —
Hoard Exploration Co. 99
Houston Oil Field Material Co. —
Houston Ready-Cut House Co. —
Hughes Tool Co. First Cover
Humble Oil & Refining Co. 100
Hyatt Roller Bearing Co. —
Hydril Co. Fourth Cover

I

Independent Exploration Co. —
International Cement Corp. 73
International Derrick & Equipment Co. 23
International Harvester Co. —
The International Nickel Co. —
The International Petroleum Exposition —

J

Byron Jackson Co. —
Jarecki Manufacturing Co. —
Jensen Brothers Manufacturing Co. 96
Johns-Manville Corp. —
S. M. Jones Co. 4
Jones & Laughlin Steel Corp. —

K

Kerotest Manufacturing Co. 40
Kibele Manufacturing Co. —

L

Landis Machine Co. —
Larkin Packer Co. —
The Lane-Wells Co. 97
Layne & Bowler Co. 102
M. J. Lewis Oil Well Service —
The Lincoln Electric Co. —
Link Belt Co. —
Neal Lucey Co. —
Ludlow Valve Manufacturing Co. —
Lufkin Foundry & Machine Co. 28

M

M. & V. Tank Co. —
MacClatchie Manufacturing Co. —
Maintenance Engineering Corp. 87
D. S. Mair Machinery Corp. —
Maloney Tank Manufacturing Co. —
Manufacturers Supply Co. —
Martin-Decker Corp. —
F. G. Masquelette & Co. —
McAlpin Hotel —
McIntosh & Seymour Corp. —
Geo. S. Mepham Corp. —
Merco Nordstrom Valve Co. —
Miller Sand Pump Co. —
Mission Manufacturing Co. 68-69
Lee C. Moore & Co. 15
Muskogee Iron Works —

N

Page

National Bank of Tulsa —
National Exploration Co. 99
The National Supply Co. 19
National Tank Co. —
National Tube Co. 59
Naylor Pipe Co. —
New Deal Specialty Co. —
Norvell-Wilder Supply Co. —

O

Walter O'Bannon Co. —
Oil Center Tool Co. —
Oil Development Co. of Florida 99
Oil Equipment & Engineering Exposition —
Oil Well Supply Co. —

P

The Parkersburg Rig & Reel Co. 6
Patterson-Ballagh Corp. —
Pelican Well Tool & Supply Co. 89
Petroleum Electric Power Club —
Petroleum Rectifying Co. 25
Piccadilly Hotel 92
The Pierce Governor Co. —
Pittsburgh Equitable Meter Co. —
Pittsburgh Steel Co. 49
Portable Rig Co. —
Producers Supply & Tool Co. —

R

J. P. Ratigan Co. —
Raybestos Manhattan, Inc. —
Reading Iron Co. —
Rector Well Equipment Co. —
Reed Roller Bit Co. 38-39
Republic Portland Cement Co. —
The Republic Rubber Co. —
The Republic Steel Corp. Insert, 34-35
Norman H. Ricker 99
The Ridge Tool Co. —
Dewey T. Ross, Inc. —

S

J. A. Schley —
Schlumberger Well Surveying Corp. —
Seismic Explorations, Inc. —
J. E. Shaffer Co. —
Shaffer Tool Works —
Shand & Jurs Co. —
Shell —
Sinclair Refining Co. —
SKF Industries, Inc. —
A. O. Smith Corp. —
E. M. Smith Co. —
Nowery J. Smith Supply Co. 99
South Chester Tube Co. —
Southern Engine & Pump Co. —
Southern Pacific Lines —
Southern States Co. —
Spang, Chalfant & Co. —
Sperry-Sun Well Surveying Co. 84
Star Drilling Machine Co. —

T

Templeton, Kenly & Co. 99
Texas Electric Steel Castings Co. 95
Texas Iron Works —
Thermoid Rubber Co. —
The Timken Roller Bearing Co. —
Titusville Iron Works Co. —
Tretolite Co. —
Edgar Tobin Aerial Surveys 83
Trimont Manufacturing Co. —
Twin Disc Clutch Co. —

U

Union Carbide & Carbon Corp. 55
Union Wire Rope Co. —
United States Rubber Products, Inc. —
United States Steel Corp. 59

W

Waukesha Motor Co. —
Westinghouse Electric & Mfg. Co. —
The Wheland Co. —
Wickwire-Spencer Steel Co. 41
J. H. Williams & Co. —
Williamsport Wire Rope Co. 105
Wilson-Snyder Manufacturing Co. —
Wilson Supply Co. 57

Y

Youngstown Sheet & Tube Co. —

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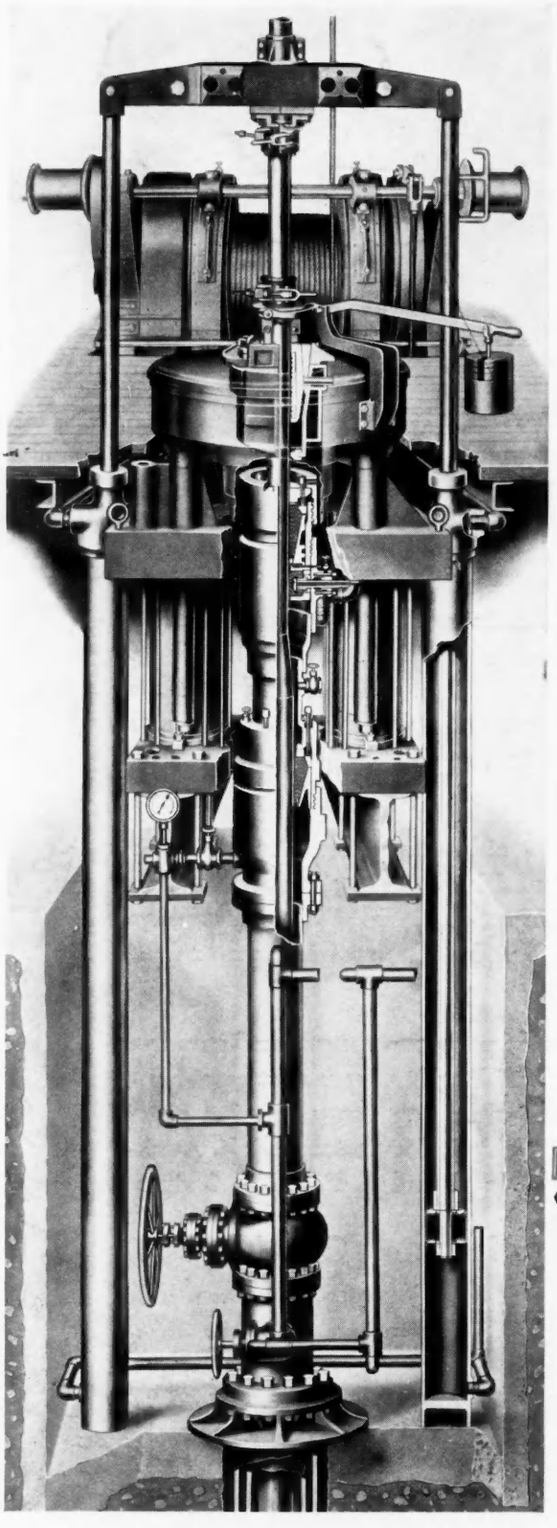

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